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TRANSACTIONS

OF THE

Mississippi Valley Medical Association.

TWENTY-SEVENTH ANNUAL SESSION

HELD AT

HOTEL VICTORY,

PUT-IN-BAY ISLAND, O., SEPTEMBER 12, 13, and 14, 1901.

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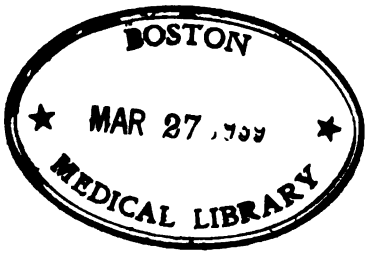

NOTE.

By vote of the Executive Committee at Kansas City, 1902, this volume was ordered printed, sufficient funds being available.

The Association assumes no responsibility for the views expressed in the papers read at its meetings.

CONTENTS.

PAGE

List of Officers for the Year 1901, ... vii

List of Officers for the Year 1902, ... viii

Address of the President, Dr. A. H. Cordier, Kansas City, Mo., ... 1

Address in Medicine. By Dr. Frank Billings, Chicago, Ill., ... 11

Address in Surgery. By Dr. Reginald A. Sayre, New York, N. Y., ... 22

Papers:

I. The Treatment of Tuberculosis at Home. By C. F. McGahan, M. D., Aiken, S. C., ... 34

II. Formaldehyde and its Salts in the Treatment of Tuberculosis. By H. C. Howard, M. D., Champaign, Ill., ... 42

III. Scientific Aids to Diagnosis. By Henry D. Holton, A. M., M. D., Brattleboro, Vt., ... 60

IV. A Discussion of the Morbid Conditions of the Upper Respiratory Tract Resulting from the Infectious Diseases. By Carolus M. Cobb, M. D., Boston, Mass., ... 70

V. Asthma. By John North, A. M., M. D., Toledo, O., 84

VI. Hay Fever. By A. D. Murphey, M. D., Cincinnati, O., ... 96

VII. Some of the Evil Effects Resulting from the Use of Alcoholic Liquors. By T. B. Greenley, M. D., Meadow Lawn, Ky., ... 104

VIII. Some Obscure Injuries Following the Toxic Use of Alcohol. By T. D. Crothers, M. D., Hartford, Conn., ... 111

IX. "Dentists' Neck," an Undescribed Neurosis. By Albert E. Sterne, A. M., M. D., Indianapolis, Ind., ... 122

PAGE

X. The Acquirement of Nervous Health. By F. Savary Pearce, M. D., Philadelphia, Pa., . . . 133

XI. The Necessity of and Indications for the Bed Treatment of the Insane. By Frank Parsons Norbury, M. D., Jacksonville, Ill., ... 140

XII. Hematology. By L. H. Warner, M. D., New York, N. Y., ... 149

XIII. Anemias Secondary to Gastro-Intestinal Disease, with Report of Two Cases. By G. W. McCaskey, A. M., M. D., Fort Wayne, Ind., ... 162

XIV. Auto-Intoxication and its Treatment. By Chas. H. Shepard, M. D., Brooklyn, N. Y., ... 169

XV. Intestinal Auto-Infection. By John M. Batten, M. D., Downingtown, Pa., ... 178

XVI. The Dyspeptic's Diet. By Geo. D. Kahlo, M. D., Indianapolis, Ind., ... 191

XVII. Pharmacologic Action of Drugs. By E. M. Houghton, M. D., Detroit, Mich., ... 198

XVIII. Adrenalin, the Active Principle of the Suprarenal Gland, and its Mode of Preparation. By Jokichi Takamine, M. D., New York, N. Y., ... 202

XIX. American Aboriginal (Indian) Contributions to Therapeutics. By B. T. Whitmore, M. D., LL. D., New York, N. Y., ... 212

XX. The Young Physician. By Emil Amberg, M. D., Detroit, Mich., ... 229

XXI. The Surgery of Pulmonary Abscess, Gangrene, and Bronchiectasis following Pneumonia. By Daniel N. Eisendrath, M. D., Chicago, Ill., . . 239

XXII. The Necessity for Exact Diagnosis in Certain Operative Prostatic Diseases. By Louis E. Schmidt, M. D., Chicago, Ill., ... 257

XXIII. The Limitations and Uses of the Galvano-cautery in Prostatic Surgery. By Wm. N. Wishard, M. D., Indianapolis, Ind., ... 265

XXIV. Circumcision and Venereal Diseases. By W. A. Spitzley, A. M., M. D., Detroit, Mich., ... 270

PAGE

XXV. Modern Methods of Treating Syphilis. By Eugene Carson Hay, M. D., Hot Springs, Ark., ... 277

XXVI. Some Causes and Remedies for Ignored Syphilis. By M. L. Heidingsfeld, M. D., Cincinnati, O. *Illustrated*, ... 287

XXVII. The Severing of the Vas Deferii and its Relation to the Neuro-psychopathic Constitution. By H. C. Sharp, M. D, Jeffersonville, Ind., ... 301

XXVIII. Surgical Treatment of Palatal Defects. By Truman W. Brophy, M. D., D. D. S., LL. D., Chicago, Ill., ... 309

XXIX. Fractures. By E. B. Smith, M. D., Detroit, Mich., ... 325

XXX. A Preliminary Report on Sterilization of Rubber Gloves, etc., by Formaldehyde Gas, and On the Use of Mild Antiseptics Inside the Gloves. By A. Goldspohn, M. D., Chicago, Ill., ... 339

XXXI. Infection from the Bacillus Ærogenes Capsulatus: Report of a Case. By Julius H. Jacobson, M. D., Toledo, O., ... 350

XXXII. Movable Liver—Hepatopexy. By J. H. Carstens, M. D., Detroit, Mich., ... 365

XXXIII. Varicose Veins and their Treatment. By J. Lively Johnson, M. D., Louisville, Ky., . . 378

XXXIV. Tripartition in the Study of the Female Pelvis. By A. Ernest Gallant, M. D., New York, N. Y. *Illustrated*, ... 388

XXXV. Congenital Valvular Obstipation. By Thos. Chas. Martin, M.D., Cleveland, O. *Illustrated*, 399

XXXVI. The Use and Limitations of the Elastic Ligature in Intestinal Surgery. By Theo. A. McGraw, M. D., Detroit, Mich., ... 404

XXXVII. The Surgical Features of Typhoid Fever and Dysentery. By Hal C. Wyman, M. S., M. D., Detroit, Mich., ... 413

PAGE

XXXVIII. Some Indications for Gastro-enterostomy. By William J. Mayo, A. M., M. D., Rochester, Minn., ... 417

XXXIX. Features Determining Permanency of Cure in Radical Operations for Hernia. By A. J. Ochsner, M. D., Chicago, Ill., ... 436

XL. Suture of the Abdominal Wall. By Charles Davison, M. D., Chicago, Ill. *Illustrated*, . . 449

XLI. Appendicitis, with Report of One Hundred Consecutive Cases Operated. By Wm. J. Gillette, M. D., Toledo, O., ... 466

MINUTES OF THE TWENTY-SEVENTH ANNUAL MEETING, PUT-IN-BAY, O., SEPTEMBER 12, 13, AND 14, 1901, . . 481

MINUTES OF THE MEDICAL SECTION, ... 493

MINUTES OF THE SURGICAL SECTION, ... 496

NECROLOGY, ... 498

ROSTER, ... 500

INDEX, ... 507

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ADDRESS OF PRESIDENT.

SOME PHASES OF NEPHRO-LITHIASIS.

By A. H. CORDIER, M. D.,
Kansas City, Mo.

I assure you I feel that the words at my command are inadequate to express my appreciation and thanks for the honor you have conferred on me by selecting me for your President. It is an honor of which any one, I am sure, should feel proud. To preside over a Society composed of the stars of the medical world is a function of much honor and mutual responsibility—the responsibility for a successful meeting not falling alone on the officers, but on each individual, as on your co-operation hangs the success of this meeting. I desire to express my thanks for the efforts of each member of the Association, and to your worthy secretary, Dr. H. E. Tuley, too much praise can not be given for his untiring efforts and enthusiastic zeal in the arranging of the excellent program for our work.

The most difficult task to me, as your President, has been the writing of this address. I fully realize that the membership of this great Association is made up of the representative, hard-working, and most scholarly gentlemen in the territory in which they reside. A recognition of this fact does not, I assure you, make the writing of an annual address more easy—far from it. I realize that each and every one present has, during the past year, kept himself thoroughly informed on the progress in the various departments of medicine and surgery; hence what I may say in this paper is merely the performance of a duty as prescribed by the by-laws of the Association.

It is a pleasure to review the progress made in surgery by American physicians. The birthplace of most operative

procedures is found within the domain of the United States, the originator, in many instances, having been at some time a member of this Association. What an inheritance for operators of to-day! Review the list and it is inspiring. We doff our hats in humble admiration to those who by their labors have smoothly paved the way and removed many stumbling blocks of difficulty and uncertainty.

The supreme benefit of these annual meetings exists in the remembrance of the priceless works of those who attend and enter into these discussions.

The beneficent yield of the fruits of the labors of those who have gone before is gathered by us to-day, and a new crop sown, with cultures of modern technique as the fertilizer. The architects and pattern-makers of much of our work of to-day wrought long ago and have passed on, their places being filled by others. The yoke is taken up by the younger generation at the point where it was laid aside by these pioneers. Sufficient traces of their noble designings have remained to show us that they must have been masters at the period in which they lived.

"Originality, after all, in most instances is the ability to do better what has been done before." Many old and long since abandoned surgical procedures have been resurrected under new names, and made life-saving and comfort-giving methods by the skilled modern surgeon. While the foregoing statement is in the main true, yet as we reflect upon some of the abandoned ideas or practices of a few years ago, there comes a feeling of sad enlightenment, a sagacity that lays our errors bare and leaves us without excuse in our own eyes. The adaptability of the human intellect in the selection of the good and worthy, and the just rejection of the harmful and useless, is no better amplified than in the noble profession to which we have the honor to belong. It is true that too many modifications of ideal surgical procedures have been placed before our profession by overzealous members, but when tried and found wanting they

have been quickly rejected and thrown into the rubbish heap, to remain there unless resurrected by some one who has not kept abreast of the times, and who knows not the history of their birth, life, and death.

> **Life is a leaf of paper white,**
> **Whereon each one of us may write**
> **His word or two, and then comes night.**

We owe our predecessors a debt of gratitude which we can only pay in installments, by accepting their good precepts and following them, or improving them if possible. The great work of our faithful and skilled predecessors would soon become a lost art, and the wheel of scientific progress cease to turn forward, were it not for the labors of the members of our profession who are not content to idly look on at the suicide of the created works and results of the past masters of our art. "Perpetual work is the law of art, as it is the law of life."

Expansion in surgical procedures is not an untried venture with the surgeons of the United States. The surgery of to-day is certainly an illustration of the fact that pioneers are still working on the surgical frontier. Pathological territory that was unknown a few years ago has been carefully located, surveyed, colonized, and taken possession of by the modern pathologist and surgeon. Hemorrhage from incised parenchymatous organs had long been dreaded, and had thus stayed the progress of surgery in these organs for years. When it was demonstrated that in most instances this fear was an ungrounded apprehension, the surgery of such organs took its position in the front rank of legitimate and justifiable procedures. This rapid stride has been nowhere noticed more than in the surgery of the kidney, and this event marks one of the notable epochs in surgical history. With the disappearance of this timidity on the part of operators, a brilliancy in surgical procedures and results was born that has not been excelled in any other department of surgery.

The surgery of life-essential organs should always, when possible, be prophylactic in its aims. The original pathology should be removed early, thereby preventing the destruction of the function of the organ involved. This means early diagnosis and quick surgery in all surgical diseases of that organ. In no organ does this axiom apply with more emphasis than to the kidney.

Lumbago, dorsal neuralgias, perinephritic abscesses, and sprained backs are far less numerous, and nephritic calculi more frequent since surgery has invaded this locality and proved the true source of these manifested symptoms of a stone long remaining in the kidney. Persistent urinary fistula will become less prevalent even than to-day, following a nephrotomy, as the diagnosis is made earlier and surgery resorted to sooner.

A wound in a healthy kidney will heal as readily as in any other structure. Recognizing the importance of an early prophylactic operation and the certainty of an early union of the kidney wound, the surgeon of to-day is warranted in resorting to an exploratory nephrotomy when in doubt as to the presence or absence of a nephritic calculus.

Pyonephrosis and hydronephrosis are late manifestations of stone in the kidney, and should not be permitted to occur when the diagnosis is made early in the case. I realize that this is ideal surgery, and can not be attained in all cases.

The presence of a stone in the kidney is ever a menace to life and a source of danger to the functional integrity of the kidney affected, and even to the opposite kidney through sympathy, as has often been the case where a calculous anuria has developed when only one kidney was the site of the calculi.

That a stone may form in the kidney at any age has been long known, and that the composition of the stones, as a rule, varies according to the age of the patient, the rule being that this composition is urate of ammonium in children, uric acid

in adults, and phosphate or oxalate or lime in patients past forty. The stones may vary in number from one to one hundred or more, the size varying from mere grains to several ounces, and the shape varying according to the size and location, and also the chemical composition of the calculus. One of my specimens weighs over three ounces, and is the exact shape as was the dilated pelvis and calices. This was a phosphatic stone.

These calculi may form in either kidney or both at the same time, yet my experience has been confined entirely to stones occurring in the right kidney. Why the right kidney should be selected no one, so far as I know, has up to this time been able to explain satisfactorily. There are a number of accepted reasons for the displacement of the right kidney in so-called movable kidney. I am firmly of the opinion that some of the conditions existing as a result of this displacement have much to do with the formation of stones, yet I do not believe that this is the only causative factor. The ascending colon, with its ever-present myriads of colon bacilli, and its distended condition resulting from gases and feces moving against the forces of gravity, produce a pressure on the right kidney and ureter that results in an impediment to the free flow of the urine. This, added to a possible partial bend in the ureter, from a kidney displacement, would produce an ideal condition for urinary sedimentation in the pelvis of the kidney. The colon bacillus has been found so frequently in the pelvis of the kidney in stone cases as to warrant giving to this bacillus some credit for the infection found at the time of the removal, and I believe that its presence here is a factor in the production of the calculi. Extensive suppurative processes in the kidney in the presence of a stone are late developments.

These stones are not formed in a few weeks, but many months and even years may be occupied in making a stone of any magnitude, yet a phosphatic calculus may form very rapidly. A stone having formed to a size too large to pass

through the ureter will continue to enlarge until its presence brings about a train of symptoms pointing to an involvement of the kidney proper. If the stone is small enough to pass through the ureter without any resistance, its passage may not be discovered. It may escape through the urethra, or, remaining in the bladder, act as a nucleus for a cystic calculus. If the stone is small enough to become engaged in the ureter, and too large to rapidly go through, it then gives rise to a train of symptoms, the main feature of which is a most intense pain in the back and along the course of the ureter, with retraction of the testicle, irritable bladder, and transient anuria followed by a polyuria and blood in the urine after the affected ureter is again opened. With this set of symptoms all are familiar. It is the case which does not present the typical symptoms that we, as surgeons and practitioners, wish to study, as upon a correct understanding of these atypical cases depends the relief of the suffering and the saving of the kidney.

In cases where the stone does not make its exit from pelvis into ureter, but remains in the kidney, a group of symptoms is presented almost characteristic of this condition. A prior history of nephritic colic is usually obtainable; then a quiescent period, extending over a period of weeks, months, or possibly years; then a recurrence of the colic spells, or a history of repeated attacks of hematuria may be obtained, the hemorrhage and pain being provoked by exercise, riding over a rough road on horseback or in a vehicle. It has been my experience that the cases having hematuria oftenest are freest from intense colic. This is due to the stone being irregular and rough, yet too large to become engaged in the pelvis or ureter. While these cases have pain, it is confined to the region of the kidney and rarely extends down the ureter.

In these cases the pain is never so severe as that caused by the ureteral stone. There may be a large and rectangular stone and at the same time a "ball valve" ureteral stone.

This would be disposed to mislead at the time of operation. A carefully gleaned clinical history will usually point to the correct condition and location of the stone or stones.

A large or small stone in the pelvis of the kidney, which intermittently blocks the uterer, will give rise to a pyonephrosis or a hydronephrosis, transient in character, the constitutional manifestations depending upon the presence of infection in one, and the absence of infection in the other.

If an extensive infection of the pelvis is present, the characteristic enlargement will take place at the site of the kidney, and if the ureter is more or less patent an abundance of pus will be detected in the urine. Many of these cases of calculous pyuria will give rise to a persistent cystitis as the dominant symptom, and bladder-washing will often be resorted to without avail. A large or small stone in the kidney, when accompanied by infection, is a constant menace to the functional safety of the kidney. In arriving at diagnosis of a nephrolithiasis with infection of an enlarged kidney, gall-stone colic must be eliminated.

Where there is suppuration and a large stone, the diagnosis is easy. While it is desirable to diagnose these cases, our efforts should be expended in the direction of preventing the formation of these large stones, thereby warding off the late destructive processes in the kidney, brought about by permitting these stones to remain until this suppurative process occurs. A history of previous renal colic, even though long ago, the presence of lumbar pains on one side (when crystals of uric acid and oxalate of lime are frequently found), tenderness over the kidney, recurrent hematuria, irritable bladder or pain and hematuria increased by exercise, etc., is sufficient to warrant a diagnosis, or an approach to the same, justifying an exploratory incision. This procedure is a safe one, and no harm will result from it in skilled hands. Many other conditions giving rise to pain, etc., may be relieved by this operative procedure.

A number of other conditions of the kidney and ureter give rise to symptoms simulating stone. These are often relieved by this so-called exploratory incision. It must be remembered that a calculus may exist in the kidney without giving rise to any symptoms. X-ray examinations will show the presence of large calculi, but a failure to find a stone by this method should not deter the surgeon from exploring for it when symptoms point strongly to its presence. A kidney stone that fails to pass through the ureter, and assumes a quiescent state, is a dangerous tenant and should be removed.

CASE I. Mrs. B. *Right Kidney.* Twenty years ago she passed the first calculus from the right kidney. This stone was the size of a small mulberry. She had passed considerable "sand" for some months prior to the passage of the first stone. This stone was seven weeks passing, causing intense pain. She had a comparative freedom from pain for twelve years, then passed a second stone, not so large as the first, but which caused much pain during its passage. After this attack she passed a great deal of "sand." She continued having attacks of renal colic at the rate of two or three a year, passing stones with each attack. These stones were irregular in size and shape. Three weeks ago she passed three small stones.

She has not had much pain in the back. The pain has been in front, over the kidney and down along the course of the ureter and distribution of ilio-inguinal and genito-crural nerves. During the passage of the stones the bladder has been irritable. All told, she has passed from the kidney thirty or forty stones. Six months ago she had an attack of renal colic, and the urine became scanty and very cloudy, and blood was noticed. She has never had a hemorrhage from the kidney. During the last six months she has never been free from pain, and in this time she has passed seven calculi. Five weeks before entering the hospital the kidney became perceptibly enlarged and very tender to touch. She had fever and sweats. The urine was loaded with pus, and diminished in quantity. Examination revealed the kidney enlarged, tender, and displaced downward. The patient was much emaciated.

Operation, retro-peritoneal incision. Kidney incised on posterior surface, a large amount of pus escaping. On intro-

ducing the finger into the kidney I found a mass of calculi wedged into the pelvis and calices, the stones, eight in number, varying in size from 300 grains to the size of a pea, and composed of phosphate of lime. The kidney was irrigated, a drainage-tube inserted, and gauze packed into the kidney to control the hemorrhage. This kidney was making considerable urine. This case is still under observation in the hospital. She is much improved in weight and appearance. The ureter is open, and her progress toward recovery is all that could be desired.

This lady presented herself to me three years ago, and I made a diagnosis of stone in the kidney and placed her in the hospital for operation, but she left, refusing to undergo the operation.

CASE II. Mrs. P., aged 36. Several years ago this lady had one attack of right nephritic colic, lasting two or three days. The stone did not pass, or at least she failed to detect it. Since then, up to the time of the operation, she had a vague sense of uneasiness in the region of the right kidney.

A year before she came under my care she began having a cystitis, and was treated for it by local methods, in the way of irrigations of the bladder, etc. This course of treatment failed to bring her any relief of the bladder symptoms. The cystitis was of kidney origin. There was no history of hematuria or anuria.

Examination elicited tenderness over the enlarged kidney. The organ was displaced downward, and fixed by perinephritic inflammatory agglutination. The usual lumbar incision, post-peritoneal. Kidney incised, and a large calculus of oxalate of lime removed, weighing 1428 grains. The kidney was drained by a tube. Ureter patent, as fluids and blood passed into the bladder at the time of operation. This kidney was saved, as it was making a large amount of urine.

CASE III. Mrs. F., aged 42. Twenty-five years ago this lady had an attack of right renal colic, and passed a small calculus. She was free from pain for a number of years, when she again had an attack of renal pain, but failed to pass the stone. For years after this she continued to have attacks of pain in the region of the right kidney. There was no blood in the urine at any time. The pain was never, in any of the subsequent attacks, so severe as in the first. She became practically an invalid ten years ago, and has remained so ever since. A secondary cystitis developed a year ago, and much pus was noticed in the urine. She became septic, and a perceptible enlargement of the kidney developed. This was nodular, fixed, and tender to the touch.

The usual post-peritoneal incision was made and the kidney opened, and a stone weighing 1540 grains was removed. Gauze and tubular drainage were employed. A large amount of pus was present. The ureter was not opened freely, yet I felt that there was no calculous obstruction, as large quantities of pus had been passing into the bladder from the right kidney.

This kidney was making fully a pint of urine in twenty-four hours. The patient is still in the hospital, but her improvement has been remarkable.

Deductions.

1. Hemorrhage from parenchymatous organs is, in most instances, easily controlled.

2. Nephrolithiasis is more prevalent than is generally supposed.

3. A stone having formed in the pelvis of the kidney, if too large to pass through the ureter, will sooner or later produce symptoms demanding its removal.

4. Suppuration, in stone cases, is, as a rule, a late process and should be prevented by early surgery.

5. A wound in a healthy kidney heals rapidly.

6. Obscure, persistent pains in the region of the kidneys, in a patient who has had a renal colic years ago, should lead to an exploration of the kidney.

7. The operation of nephrolithotomy has a very low mortality.

8. The kidney should not be removed unless practically destroyed by the disease.

9. There exists a special cause for the development of stones in the right kidney.

10. With a carefully obtained clinical history, the diagnosis of stone in the kidney is usually easy.

11. At the time of operating, the ureter should be explored, that its patency can be assured.

12. Post-operative patience and faithful effort on the part of the surgeon will result in the saving of many organs; otherwise removal will be necessary.

ADDRESS IN MEDICINE.

WHAT ARE THE QUALIFICATIONS NECESSARY FOR SUCCESS IN THE PRACTICE OF MEDICINE?

By FRANK BILLINGS, M. D.,
CHICAGO, ILL.

I desire to express my appreciation of the honor conferred upon me by the officers of the Mississippi Valley Medical Association in selecting me to give the address in medicine. The honor carries with it a responsibility which I also appreciate. Your president assured me I was at liberty to choose any subject I desired, which meant, of course, an additional obligation to you. Liberty, even the boasted liberty of this free and independent country, has its limitations—limitations which are often very marked.

The liberty which I enjoy to-day has its marked limitations, one of which is my inability to respond fully to the great opportunity afforded me.

I have chosen for a subject a question which may not interest you and those who have solved it, but which will still be, I hope, not devoid of interest.

The qualifications of success, in any walk of life, will depend, in a measure, upon the meaning of the word success. Not uncommonly, success in life means to the majority of mankind the acquisition of wealth. Indeed, so universal is this in our own country that the possession of wealth, no matter how acquired, is sufficient to endow the possessor with the title of a successful man.

The accumulation of wealth by a medical man in the practice of his profession would indicate success of far greater import than would the wealth of a merchant or other

commercial man accumulated by persistent work, because the accumulations of the doctor would usually mean a mental endowment and professional skill which as capital earned wealth. The doctor who is fortunate enough to possess a handsome income is frequently not given credit for the qualities which enable him to be thus far successful. True, a strong personality, in a proper environment, may be supported by gross ignorance and still the individual acquire a big and lucrative practice. On the other hand, enviable knowledge, fine culture, and much practical experience in even good surroundings, when borne by a weak personality, may find but little financial reward.

A strong personality, when unsupported by knowledge, will invariably give but temporary success.

It has been my experience, and I am sure it has been yours, that ignorance will be surely discovered. You can not face all of the people all of the time in medicine, as you can not in other walks of life. Ignorance will not remain hidden even though covered with a mortar-board and scholastic gown or with a silk tie and Prince Albert coat. Unfortunately the converse is not true, for he who may be over-full of knowledge and wisdom may be unable to make the spark of his genius visible.

In one sense a good income is necessary to success. By good income I mean enough to afford the doctor and his family the comforts of life and in addition a sum sufficient to purchase the necessary periodicals, books, instruments of precision in diagnosis, etc. This does not mean a large sum; indeed, a very modest one will be sufficient.

Without a living income, life is too full of anxieties to allow one to do good work. If one can not afford the comforts of life for himself and family, the demon of discontent will certainly take up his abode with him, and a discontented man can not perform creditable work. There is a saying that success brings success, and just as surely may one say that poverty begets poverty.

I claim, therefore, that the medical man who makes money by the practice of his profession has secured a measure of success. If he have all the qualities which go to make up a successful doctor he will continue to be a success. But if the getting of money, in the amount to be termed wealth, means success even temporarily, then the successful medical men of the world are few indeed.

Doctor George F. Shrady has estimated the average annual income of medical men in cities at about $2,000 and in small towns or villages at about $1,200 to $1,500. This is the average income, and means that many receive a lesser amount. Very large incomes in medicine are rare, compared with the amount received by many of our legal friends and by commercial men. It is said that Sir Astley Cooper had an income of $100,000 from his practice. The late Wm. Pepper is said to have enjoyed from $50,000 to $60,000 annually from his work. A few surgeons of this day enjoy the reputation of incomes ranging from $50,000 to $100,000 per year.

The average physician probably receives less compensation for his services than any other member of society, when one considers the time and money spent in preparation, the responsibilities assumed, and the character of the service rendered to the patient. If money-getting were the work of success, surely the average income of the physician in both the city and the country would indicate failure of the large mass of the profession. To him who would enter the profession with the idea that he would make money, there has been disappointment in the past, and the future outlook does not appear promising.

There are in the United States of America about 120,000 physicians and surgeons. That is one to about every 600 of the population. With the average annual mortality, probably 1,500 to 1,800 die each year. The average annual increase in the population of the country for the last ten years has been about 1,000,000. This annual increase in

the population would give room, at the ratio of one physician to 600 people, for about 1,700 additional doctors annually. This, with the 1,500 to 1,800 vacancies by death, would afford locations for from 3,200 to 3,500 new doctors each year. The 160 medical colleges of the United States graduate nearly 6,000 students annually, or about 2,000 more than is provided for by the vacancies in the profession made by death and the places made by the natural increase in the population.

An overcrowded profession will limit the success of all. The best qualifications for success will be handicapped by a surplus of physicians, and the tone and standing of the profession will be correspondingly lowered.

Please pardon the digression, but I feel obliged at this point to protest against the maintenance by the profession of so many medical schools. Not one of them is too good, and many are so poor that they are marks of disgrace to the medical and lay communities in which they exist. It is an enigma that the profession of a State will permit the existence within it of a low-grade medical school, the sole purpose of which is to advertise its medical teachers. Its graduates crowd upon them, limit the field of labor, take from, but never add to, the store of medical knowledge, and debase the good name of medicine in the estimation of the people. The profession is perhaps powerless to influence the State legislatures to so modify the laws that a charter may not be obtained by any body of men who may conclude to organize a so-called medical school.

The profession has the power nevertheless to influence and direct the inquiring medical student in the selection of a good medical school. Very few individuals undertake the study of medicine without consultation with a medical friend—often the family physician. Should he not rationally use his influence to maintain a high standard of medical education for his own benefit, if one regard it only from a selfish point of view? What a responsibility he assumes in

advising the student! If a poor school from the educational point of view is chosen, he not only handicaps the medical student in his whole career, but if he have a conscience he must feel that he is responsible for lives sacrificed through the ignorance of the practitioner whom he has helped to inflict upon an unprotected community.

I did not intend to take up so much of your time with the questions so far discussed. I have dwelt upon the money side of medicine because it seems to me to deserve more consideration as an element of success in medicine than is usually admitted.

The pure medical scientist appears to despise money *per se*, but the scientist is usually not a practitioner. He nowadays has a living salary and is independent. The practitioner must be ever alert for the nimble penny with which to obtain the necessaries of life. With the practitioner it is bread first and science some time afterward, if at all.

There are other qualifications necessary to success in medicine, qualifications which are more important than money, and without which money is a negative quality.

One of the fundamental qualities is a proper education.

To-day the problems in medicine are so profound that a good preliminary education is necessary to enable the student to pursue the study of medicine rationally and successfully. A college or university education may not be necessary to fully prepare one for the study and comprehension of medicine, still it gives one the broad culture, the discipline of mind, which will add to the pleasures of life of the practitioner if it does not bring him material advantage. The time necessary to gain a thorough academic and medical education, supplemented preferably by a service on the house staff of a hospital for one or two years, will require eight or nine years. The expense is relatively great, too, much more now than in former years, for the annual course in the best medical schools extends over eight or nine months. Again, the course of study is more difficult as well

as longer, and while in former years a student could devote some time to outside work, which would help to support him, he would now sacrifice time which he can ill afford to omit from study. Happily some of our best universities and colleges have instituted courses which anticipate the medical college work. This enables the student who intends to study medicine to elect a course of study which better fits him for medicine and at the same time he may elect and complete the fundamental branches of medicine usually taught in the first year of the medical college. The student may thus save one year's time and still be as well or better prepared for his life's work than if he had taken the full academic course without thought of future medical study.

I think it a fair statement that the student who, at the cost of what may seem unsurmountable difficulties, obtains a thorough education, and especially of the fundamental branches of medicine, will rarely fail to make a success as a practitioner.

On the other hand, deficient preparation preliminary to the study of medicine, an imperfect knowledge of the fundamental medical branches, he will never make up in after life. This will surely handicap him in competition with better-prepared men.

The personal equation is important. Honesty, straightforwardness, sobriety, and a thorough appreciation of the rights of our fellowman are important elements, which, when absent, count against one in the battle of life.

The doctor of all men can least afford to be dishonest. If he practice dishonest methods with his patients in his professional intercourse, his fall will surely come. Miraculous cures, based upon false diagnoses; unnecessary operations performed for fancied or real ills; the assumption of knowledge of a condition of which he knows nothing; the attempt to perform operations of which he has not the knowledge, experience, or skill, unnecessarily jeopardizing life, or, in short, being anything but what he is, will in the end brand him as he deserves.

One who is dishonest with his patients will be equally dishonest in his intercourse with his professional brethren, and what a mistake he makes in this! It is a fundamental law in medicine that a doctor's reputation and rank in the world is fixed by his medical brethren.

The reputation one may gain in the lay community is at best but temporary if it is not supported by the respect of the medical profession. The medical man can gauge his professional brothers' knowledge, skill, and ability, and if one's work in medicine is of the quality to excite the commendation of our medical brothers, it will be reflected to the lay public. On the other hand, a reputation among the lay public will last only until a better man steps into the field, and the better man always comes.

Sobriety is a necessary element of success. Few of us are entirely free from the habitual use of tobacco and alcohol. That we would all be better off without them is probably true. Alcohol in excess, and the habitual use of opium, cocaine, and other harmful drugs, is absolutely prohibitive of success in any walk of life.

Strangely enough, statistics show that a larger percentage of doctors are addicted to morphine and cocaine than any other class of civilized people. Why medical men allow themselves to form the habitual use of drugs when they know the depressing, life-sapping, and ruinous results of the habit is an enigma.

The successful doctor must be industrious, energetic, thorough, painstaking, and methodical in all he does. His student life continues as long as he practices medicine. He must be conversant with all things new as they appear in the medical world. He must know how to do all things which are included in his field of practice at all times. If at the proper time he has acquired the proper knowledge of the fundamentals and has learned *how* to *work* his evolution will occur unconsciously to him.

Many of us, I fear, have not these requisites of success. The life of the busy practitioner is a laborious one, full of trials and hardships.

The fatigue incident to work, often at night as well as by day, too often leads to a habit of neglect of these elements so necessary to success. The country physician, who has long fatiguing rides, with exposure to all sorts of weather, may have some excuse for a habit of carelessness. But it is my experience that the practitioner in the city quite as easily falls into the habit of indifferent work.

One of the best evidences of a successful practitioner is the constant effort to make a *diagnosis*. This accomplished, the tyro may guide the medical or surgical care of the patient. And yet how few of us make an earnest effort to make a diagnosis in every case which we see! Even the most simple physical examination is often neglected. My experience is perhaps not different from that of many of you. I feel justified in making the statement that fully fifty per cent. of the people who come to me the first time, for an opinion, state that they have never before been examined. This, too, in a class of patients who have been ill for months or years.

If this is true of ordinary examinations, what shall one say of the practice of most of us in reference to the urine, the feces, the sputa, throat exudates, the eye ground, the external ear, the reflexes, the blood, etc.? And still it is within the power of every one of us to do these things. The microscope and other instruments of precision are not expensive and are within the command of every one. Let he who must, sacrifice his showy, but practically useless and expensive electric battery and get on, too, with a less number of surgical instruments, for which he often has no use. Let him buy in place of them the things which will aid him to make a more precise diagnosis.

How many of us use the microscope daily? What a world of knowledge it reveals! Supplementing the clinical

data and physical findings, it often reveals the key of the problem. The character of the urinary sediment; the presence of ameba, eggs of parasites, bacteria, etc., in the stool; the character of the bacteria in throat exudates and sputa; the number and character of the red and white blood cells are a few examples of what should make the doctor use the microscope daily.

It is true too, I think, that many physicians, who are conversant enough with the use of the microscope, believe or fear that the examinations for parasites, bacteria, etc., and blood examinations are beyond them. The fact is that like everything else the subject and operation are very simple and easily done when practiced daily. Everything which one does with facility is the result of much practice. One may have more dexterity than his brother, but practice in either case is necessary.

I hear it frequently stated that blood conditions are difficult to understand. The fact is, we know a good deal about the morphology of the blood, but beyond that our knowledge is limited and indefinite.

Therefore it is possible for one who knows the technique of the microscope to learn all that is known of the blood in a few hours. Material for practice which will render the work steadily easier is to be found in every doctor's practice.

One can not make thorough examinations successfully without keeping clinical records. Notes of the results of examinations makes one more painstaking in the method of examination. Clinical data become useful, too, for purposes of comparison with other cases and, furthermore, furnish the physician with material with which to write interesting and valuable reports and papers. Thus he may add to the sum total of our medical knowledge. He may become a supporter of, and not altogether a pensioner upon, the medical treasures of the world.

To be eminently successful, the doctor should be a good business man. In our day it is not necessary to neglect

all the principles of the good business man to be ethical. In our country it is the custom to name the fee and to accept it openly as payment for a service rendered. The custom of some other countries differs in this matter, just as did the custom of our forebearers in this and in other conduct of life. The methods of the commercial world are reflected upon and modify our professional business methods.

The doctor must learn commercial business methods in reference to accuracy in keeping the accounts of his patients, and if he would be as prompt as his butcher, grocer, and tailor in sending the accounts for liquidation he would be not a whit less ethical, and, on the other hand, would have prompt payment of his just due.

Give the patient your best efforts, with the sole purpose of relieving him and without thought of the fee. But when the service has been rendered be as energetic to secure your fees as you were to relieve the patient's suffering. A layman's gratitude for suffering relieved is in inverse ratio to the time his account runs. In sufficient time a layman may so far forget past suffering as to feel injured that the doctor should present an account at all.

We are a forgiving, patient, sympathetic, and charitable profession. Nevertheless, I can see no charity in allowing the patient to take his own time, method, and estimate of the amount the doctor should receive. I have seen too many doctor's families left in a poor financial condition by the death of the doctor, who, good, patient, and charitable to his patients, was cruel to his own dear ones because he did not practice common sense business principles.

There are many other elements of less importance than the ones I have named which modify the success of the doctor. I have, however, said enough.

In closing, let me quote from an address made by Dr. John S. Billings, of New York, on the career of the medical man:

"I call that a successful career in which a man has done good work, the best of which he is capable, work in which he

was strongly interested and which in itself gave him pleasure; work done unselfishly because he believed it to be good work, which ought to be done, and not as a means grudgingly made use of to obtain wealth or power as the real object sought. It is a career which has secured a happy home with sufficient means to support it, although it may not have led to wealth. It has brought its pursuer the approval and friendship of those best acquainted with his life and work, although it may not have made him famous or given him decoration and honors; it has made his advice valued and sought by those who know him.

"The man who achieves such a career has not been dependent on his acquaintances for his happiness, he has not fretted and worried because his family, his friends, his associates, or the State have not recognized his merit according to his conception of it, for he has acted on the principle that he exists for their benefit and that they are not merely his appendages."

ADDRESS IN SURGERY.

By REGINALD H. SAYRE, M. D.,
New York, N. Y.

As we stand here on the threshold of the twentieth century, it has seemed to me that we may with profit glance over the status of surgery during the past and note the change that has taken place in men, methods, and modes of thought; and perhaps it may be interesting to speculate for a few moments on the position which surgery will attain during the hundred years which lie before us.

While the physician of olden time was the wizard who healed diseases with charms and philtres, the priest who used his supernatural powers and relied on his intelligence (ψυχῆ) for performing his cures, the surgeon, on the contrary—the chirurgeon—(χειρ εργον) was the "handy man" whose skill lay in the clever use of his fingers, which served his purpose as the mental faculties of the physician were called to aid in treating his patients.

This was not so much the case in the earlier times, for in the words of Galen: "As man is the wisest of all animals, so the hands are the instruments which belong to a wise being. For man is not the wisest of animals because he has hands, as says Anaxagoras, but he has hands because he is the wisest, as says Aristotle, who judges very judiciously. In fact, it is not by his hands, but by his reason, that man has learned the arts. The hands are an instrument, as the lyre for the musician or the pinchers for the blacksmith."

In the Middle Ages, however, with the general decline of all civilization throughout Europe, medicine and surgery sank to a low ebb, and with this decline surgery sank to a still lower plane than medicine in the estimation of the time. The physician held himself infinitely the higher, and called in

the barber to operate on such cases as required the knife, he himself being too distinguished a person to stoop to the soiling of his hands. The practice of many of the more difficult surgical operations was left in the hands of itinerant quacks, who handed down their secrets from father to son, as the "Incisors" and "Norsine," who cut for stone and operated for hernia.

As we glance over the pages of history we see that surgery, in common with the other arts and sciences, has been like the waves of a rising tide upon the seashore, advancing and again retreating; at times making wondrous progress, only to follow this by a still more wondrous lapse into ignorance. But as the centuries have rolled by the forgotten skill has been rediscovered, and in addition new ideas, new theories, new methods of practice have been introduced, so that the science and art of surgery to-day has reached a height of which the past never dreamed. The art of surgery seems to date from the beginning, as we find that far back in the Stone Age people trephined the skull, while the Egyptians had a treatise on anatomy which was attributed to Athothis, son of Menes, who reigned over seven thousand years ago.

We read in the Old Testament occasional references to the physician, and learn that he who injures another must pay the cost of his injuries. "And if men strive together, and one smite another with a stone or with his fist, and he die not, but keepeth his bed, then shall he that smote him pay for the loss of his time and shall cause him to be thoroughly healed."[1]

And yet we learn that faith was regarded by many as being superior to the physician in healing power, for we read that "Asa, in the thirty and ninth year of his reign, was diseased in his feet, until his disease was exceeding great; yet in his disease he sought not unto the Lord, but to the physicians. And Asa slept with his fathers."[2] This doctrine has held sway throughout all ages, and of it Guy de Chau-

[1] Exodus xxi, 18, 19. [2] II Chronicles xvi, 12, 13.

liar, in the fourteenth century, remarked: "The fifth sect is of women and many fools, who refer the sick of all diseases to the saints solely." This same cult has even now its followers, who come under the designation just quoted.

Passing from the remote and shadowy past, which is only of historical interest, there is nothing that arrests our attention until we reach the time of Hippocrates, who was born at Cos about 460 B. C., and was the son and grandson of physicians. The schools of Cos and of Cnidos were the most famous of the Greek temples of Æsculapius, and as Greece was then the fountain-head of all the civilization of Europe, so was it the chief source of all medical and surgical knowledge.

Resections of joints, incisions of the kidney for abscesses, and trephining in cases of fractures were known at this time.

It is five centuries before the next great light shines forth, and Claudius Galen, born at Pergamos, 131 A. D., wrote his treatise. During the five hundred years that intervened between these masters, decided advances were made in the art of surgery. The use of the ligature was known; it was used by Antyllus in his operation for the cure of aneurism, but seems not to have been employed for some curious reason in amputations, though Celsus speaks of using it in castration. Lithotomy was practiced by specialists, and stones too large to be extracted entire were broken up by a sort of cold chisel and hammer, the calculus being held by a crotchet in order to steady it.

Civilization now began to decline in Europe, and we turn to the Mahommedans for our next great medical author. The greatest in repute among the Arabs was Avicenna, a native of Persia, though his writings did not contain as much surgical information as those of Albucassis, who lived in the end of the ninth century, and whose writings contain the first illustrations of surgical instruments. Their writings and those of Galen and Celsus were the chief medical text-books in Europe for at least five hundred years.

Not till we reach the sixteenth century do we find any definite mark of progress. Not till we encounter Ambroise Paré do we meet a man with the power to make history, his predecessors for the most part merely quoting from the ancients. Having made use of the ligature to stop hemorrhage in wounds, it occurred to him that the same method might be employed in amputations instead of the cautery, and putting his theory into practice, being careful, however, to have the cautery at hand, he had the joy of finding he was correct. Strange that so simple an expedient for the arrest of hemorrhage, which had been known at least fifteen hundred years, should not sooner have been employed in amputations; and stranger still that one hundred years later the practice should have been denounced in the Gale lecture before the barber-surgeons of London.

From the sixteenth century surgery began once more its forward movement, and each decade was marked by new suggestions as to treatment. When we consider the conditions under which the surgeons of that time labored, the wonder is not that they did so little, but that they had the courage to attempt so much. The difficulty attending the study of anatomy rendered exact knowledge possible only for the few, and the difficulty of operating without anesthesia made simply impossible many of our modern operations.

It is true that various substances were used from time immemorial as sleeping potions, as, for example, this recipe from "The Physicians of Myddvai," published in the thirteenth century: "Take the juice of orpine, eringo, poppy, mandrake, ground ivy, hemlock, and lettuce, of each equal parts. Let clean earth be mixed with them and a potion prepared; then without doubt the patient will sleep. When you are prepared to operate upon the patient, direct that he shall avoid sleep as long as he can; and then let some of the potion be poured into his nostrils and he will sleep without fail. When you wish to awake him, let a sponge be pounded

in vinegar and put in his nostrils. If you wish that he should not waken for four days, get a pennyweight of the wax from a dog's ear and the same quantity of pitch, administer it to the patient and he will sleep. When you would that he should wake, take an onion compounded with vinegar and pour some into his mouth and he will awake."[1]

These anesthetics, however, were but seldom used, and in spite of the suggestion by Sir Humphry Davy in 1800 that "Nitrous oxid gas may probably be used to advantage in surgical operations," and the statement in 1828 by Hickman that he had produced insensibility by the inhalation of certain gases, it was not until 1846 that the successful administration of ether by Morton in the Massachusetts General Hospital during an operation by Warren, and the introduction of chloroform in the following year by Sir James Y. Simpson, of Edinburgh, gave the world the great boon of insensibility to pain under surgical procedures and rendered possible the surgery of to-day. We of the present time can hardly realize the change in methods brought about by this discovery, but may gain a little insight into the enormous impetus that it gave to surgery by learning that before the introduction of anesthesia the average number of operations performed in the Massachusetts General Hospital was three a month, while at present it is over ten a day.

The next great advance in surgery was the establishing of antiseptic and aseptic surgery on a firm and enduring basis, when Lister applied the principles elaborated by Pasteur in his laboratory to the practice of surgery, and successfully abolished suppuration.

Looking backward over this vast field of human endeavor, we see that more has been done in the past hundred years than in the seven thousand that preceded them. Men of intelligence and daring originated bold operations in the past, many of which were performed only to be forgotten, and rediscovered and again forgotten as their execution

[1] The History and Literature of Surgery—Billings.

under existing conditions called for such exceptional qualities both on the part of surgeon and patient that opportunities for their performance were rare indeed. But thanks to the influence of anesthesia and asepis the nineteenth century has seen such strides in surgical science as makes all that has gone before sink into insignificance.

In the last quarter of the past century also we have seen developed methods of research that were not at the disposal of our ancestors, and surgical practice has changed from being the empirical trial of methods suggested by chance to the practical application of scientific truths discovered in the laboratory.

The equipment of the recent college graduate of the present century far surpasses that of the middle-aged practitioner of fifty years ago. The course of study which was a repetition of a series of lectures on seven subjects for two sessions, perhaps less, has given way to a graded system of instruction covering four years of study, in which practical acquaintance is had with all the modern means of research, and the surgeon of the twentieth century who would make his mark must not only be endowed with keen perception, firmness of purpose, and dexterity of touch, but must have that general knowledge of physics—chemistry, microscopy, and bacteriology—that will enable him to summon to his assistance all the latest methods of scientific laboratory research in the diagnosis and treatment of the diseases with which he is brought in contact. He need not necessarily himself be thorough master of all the technique of the laboratory, though it were well that he should be; but he should have a knowledge of these subjects that will enable him to associate with himself those who can clear up obscure points in the diagnosis of uncertain conditions by the exact methods of modern science.

Let us for a moment glance at some of the advantages which may be derived from the laboratory by the modern surgeon.

The examination of the blood is one of the most important aids to him, as by its means a simple anemia, which only requires proper treatment for its relief, can be diagnosticated from the pernicious variety. In detecting an early sepsis, examination of the blood is one of our most reliable aids. It is striking how small an amount of pus can raise the count of the white cells. According to Cabot a felon which contains less than half a drachm of pus often gives a blood-count between 15,000 and 22,000, a gum boil 27,000, etc. In fact, active suppuration in a confined space is almost invariably accompanied by leucocytosis, which subsides slowly after operation. In addition to the increase in the numbers of the white cells, Goldsberger and Weiss have described a reaction to iodine in the leucocytes, using a solution as follows:

℞ Iodi sublim., ... 1
Kalii iodide, ... 3
Aq. dest., ... 100
Gummi ad syrupam.

This solution is painted on a slide and the unstained cover-glass pressed down on it. Normal blood, or that of non-suppurating diseases, gives red cells dark yellow, white cells light yellow, with refractile yellow nuclei; in pus cases leucocytes are brown. After drainage the color gradually disappears.

The counting of the white cells is best done in the same preparation with the red. It requires a Zappert chamber (Ewing's modification). Dilution must be made with Torsson's fluid.

Methyl violet, 5 B., ...025 gm.
Iod. chlor., ... 1.000 gm.
Iod. sulph., ... 8.000 gm.
Neutral glycerine, ... 30.000 cm.
Aq. dest., ... 160.000 cm.

In a few minutes the leucocytes show a bluish color.

Cabot, from over a hundred cases of appendicitis, concludes:

1. Red cells. No change occurs save in old chronic abscess.

2. Coagulation is slow, but fibrin is increased.

3. As in most infections, the mildest and the severest cases show no leucocytosis. This absence in a case which is distinctly serious is as bad a prognostic as in pneumonia or diphtheria.

4. Catarrhal appendicitis is really accompanied by leucocytosis.

5. An increasing leucocytosis is equivalent to a spreading process and may be the sole evidence of this fact; a steady increase is a very bad sign, and is more important than a large count which does not increase.

6. After walling off, the count remains stationary or decreases. On the other hand, the blood in typhoid fever shows very different reactions. The whole blood commonly suffers concentration from the diarrhea and hemorrhages. Fibrin formation is usually deficient. *Red cells* during fever generally show a gradual decline, but are never under four million, and often over five million. This, however, is negative.

The white cells. The more severe the typhoidal infection the lower is the count. This may go from one thousand to two thousand. When leucocytosis exists it is from ulcers, hemorrhage, or pneumonia. Cold baths mass the white cells in the peripheral capillaries. We differentiate typhoid fever from suppurative processes by polynuclear leucocytosis.

In a case of obscure abdominal pains, elevated temperature, bowel disturbance, the surgeon may well be in doubt as to the condition with which he is confronted, and the importance of promptly making a certain diagnosis is evident, as it may mean the difference of life or death to the patient. We have the means of making this diagnosis in the examination of the blood, adding to the count of the cells the reaction discovered by Widal, who demonstrated that if the serum from a typhoid patient be added to a bouillon culture of typhoid bacilli the latter lost their motility and became agglutinated in masses. While the serum from a blister,

etc., may be used, that from the blood is best for the purpose. Blood dried on a glass slide may be kept for days and be transported anywhere. Park finds it as active as serum. Before use it is dissolved by moistening with water and added to the bouillon culture, and the Widal reaction should occur in five minutes if typhoid is present.

Fever and chills due to malarial infection also can be differentiated from pyogenic sepsis by finding the plasmodium of Laveran in the blood, and the spirillum of relapsing fever discovered by Obermyer in 1873 may clear up a diagnosis in case one encounters this rare disease.

The surgeon for years has made use of urinary examinations, but I fear often in a perfunctory kind of a way, as a preliminary to the choice of anesthetic, doing no more than determining the presence or absence of albumen and sugar, leaving to the genito-urinary specialist such refinements as examining for the blood, or blood pigment, indican, so suggestive of obstruction of the intestinal canal, or carcinoma of the liver and stomach, and the still further refinement of removing the urine from each kidney separately, by the ureteral catheter or Harris's segregator. Urine thus collected may give information of the utmost importance in the early diagnosis of renal calculus, a pyelitis, or tuberculosis, and timely operation save the patient's life.

The physiological chemist comes to the aid of the surgeon in diseases of the stomach. In gastric ulcer or in cancer originating from an old ulcer an increase of free hydrochloric acid is found, while the total absence of hydrochloric acid is a quite characteristic but not universal symptom of gastric cancer. In the same way a marked lactic acid reaction is extremely significant, but not absolutely pathognomonic of gastric cancer. The absence of lactic acid does not, however, forbid the existence of it. We should therefore expect to find in cancer of the stomach the free hydrochloric acid greatly diminished or absent unless the growth had as a base an old gastric ulcer. The ferments are not unfrequently absent.

Lactic, acetic, and butyric acids are present in quantity after Boas-breakfast. Mucus, coffee grounds material, stagnant food, and the Boas-Oppler bacillus go to make up the laboratory diagnosis. The unusually long rods of this bacillus are frequently joined by their ends, forming characteristic long coagulating threads, stained by methylene blue and other aniline dyes.

The chemist also helps the surgeon in studying the motive power of the stomach by the ingenious salol test. One gram of salol in capsule is taken after a meal. The patient then urinates at intervals of one hour for twenty-four hours, in separate vessels, each specimen being tested for salicyuric acid by sesqui-chloride of iron, which gives a violet color. As the salol is decomposed only in alkaline fluid, the presence of violet in the urine shows that the salol has passed into the alkaline intestine. In normal cases this should appear in one hour. If delayed beyond this, it shows a lack of motor power in the stomach, and if its presence is not manifest after twenty-four hours that there is stenosis of the pylorus. (Butler's Internal Medicine.)

Time does not allow me to do more than allude to the last contribution of the physicist to surgery, namely, the X-ray. Its use has rendered unnecessary probing for bullets, and those who have not employed stereoscopic skiagraphy can hardly understand how beautifully the depth of objects from the surface is shown by this method, and how distinctly fractures and dislocations are recognized in their proper relation. The presence of abscess in bone, and of early tubercular processes, is made clear, while the location of disease in the lungs, empyema, pericardial effusion, and new growths in the stomach are all rendered much simpler by this means.

Calculi in the kidney, ureter, and bladder can be detected by its aid, and a differential diagnosis at times is possible to differentiate between the various kind of calculi from the density of the shadow that is present, oxalic calculi casting

the densest shadow, phosphatic the next, while the uric acid stones are very easily penetrable by the X-rays, and require skill on the part both of the skiagrapher and also of the photographer who develops the plate in order to bring them into relief.

One of the most important additions to modern medicine is the so-called serum therapy, and it is not alone in medicine that it has its uses. The surgeon also has sought its aid, and not sought in vain. Tetanus, so long in mystery until the discovery of its microbe by Nicolaier in 1884, and still so dreaded in its effects, seems to be amenable to injections of antitetanic serum, if employed early enough. The Italians have had by far the best results in its use, perhaps, as Holstein thinks, on account of the superiority of Tizzoni's serum, but the results in other countries also promise much. Erysipelas is now combated by antistreptococcic serum and in certain cases of inoperable malignant bone tumors Coley's fluid has been used with success.

It does not seem too wild a dream, therefore, to hope that ere another hundred years have passed serum therapy shall have done for tuberculosis, syphilis, and a host of other diseases what vaccination has done for smallpox.

The great surgeon of the past was he who interpreted properly the clinical field in which he made his explorations. The great surgeon of the future must add to this talent the faculty of using the improved methods of research that progressive science has made ready to his hand.

One great obstacle to scientific progress in medicine and surgery has been the lack of suitable endowment for scientific laboratories, and it is owing to this lack in our own country that we have been indebted to Europe for many of the discoveries in bacteriology, as she has been far in advance of us in providing proper remuneration for those who have decided to devote themselves to experimental research in the laboratory rather than to the more lucrative field of operative work.

I rejoice to say that during the past few years provision has been made for the support of such laboratories in a greater degree than heretofore, and that within the past twelve months a most generous plan for the encouragement of scientific research has been made by one of our wealthy citizens. I believe the day is not far distant when properly endowed laboratories for the scientific study of medical and surgical problems will be as common as the struggling medical colleges have been in the past.

Another change that has come over the people, and which is making itself more conspicuous every day, is the knowledge that they can be cared for better in a hospital, nine times out of ten, than they can in their own homes, no matter how costly the latter may be, and in consequence many of them from preference are treated in hospitals who formerly could not have been induced to enter one except by the direst necessity.

The community is beginning to realize the fact that just as the artist requires special conditions in order to do his best work, which are found better in his own studio than elsewhere, so the surgeon has many more chances of success when operating in a proper hospital than in the bedchamber of his patient.

Another very potent factor in the high development which surgery has reached during the past few years is the growth of specialties, and it is in this direction, in my opinion, that the great advances in our present century will be made. I do not advocate making a specialist of a man who has not a broad foundation on which to rest, else he may dig so deep in the ground, while keeping in his own particular rut, as never to be able to see anything outside the furrow he has plowed, but I feel sure that the science of surgery is so comprehensive that he who would attain to the perfection of his art must devote himself to those parts of it which he would master with such assiduous care as to compel him of necessity to leave other fields untouched.

PAPERS.

I. THE TREATMENT OF TUBERCULOSIS AT HOME.

By CHARLES F. McGAHAN, M. D.,
AIKEN, S. C.

Mr. President and Gentlemen: I have the pleasure of bringing before you to-day the consideration of a topic that is agitating the whole civilized world. Only six weeks ago a congress was held in London on this one disease. It was as largely attended by physicians from all parts of the globe as the international congresses on general medicine. So important was the subject considered and so anxious was our profession for the report of its deliberations, that our most progressive journals arranged to receive the great Koch article by cable, and it was published on this side of the Atlantic the same week it was delivered in London. We all agree that better results are attained by the treatment of patients in sanatoria and at resorts where there are provisions made for outdoor amusements, but it is only the minority and lucky few who are fortunate enough to be able to avail themselves of these means. The overwhelming majority must be treated at their homes. I do not mean in the country a few miles from where they have dwelt, but in their actual homes. It is there the general practitioner must treat them. It will be many years before the State governments, backed by the philanthropic public, will have adequate accommodations in the different sanatoria for these unfortunates, therefore the first point for us to consider is the care we shall give them.

Fresh air being of the greatest importance, we should consider the construction of the apartment, and if there is a balcony to the house we had better place the patient's bed

upon it, and have a suitable awning made so as to shelter them; if the house should be a tenement without a balcony, the best thing to do is to fix up the roof so we can there place a bed and locate our patient outdoors. Should the house be situated in one of our smaller towns, with a small yard or grounds around it, we can build what the Germans call a *liegenhallen*, or we can put him in a tent. The liegenhallen is to be preferred because one side is entirely open, and it revolves upon cog-wheels so it can be turned to keep out the rain and strong winds, yet the patient is always practically out of doors. In selecting a tent, I prefer a circular one with a large opening in the top which will allow the foul air to escape, the fresh air entering from the bottom. Should it be more convenient for us to get the square or army tent, it will be necessary to have a large flap made in the rear part of the tent, two feet wide by two feet six inches long, directly opposite the entrance, so by leaving the flaps at the entrance and the ventilator open we will get an excellent flow of air. I prefer the tent placed upon a platform about two feet from the ground, so as to allow a circulation of air under it.

The patient must be kept warm by being warmly clad, and if necessary hot water bottles can be put in the bed.

There should be no carpet upon the floor, nor draperies in the apartments occupied by phthisical patients. The furnishings should be as comfortable as the purse can afford and as luxurious as hygiene will permit.

Care of Members of Family and Friends of Patient. It is in protecting the other members of the family from the disease that the general practitioner has the opportunity of doing the most good. He must recognize the disease early, and now that most of our States have founded bacteriological laboratories for free examination of sputa, it is the duty of the practitioner to send the sputum, in every case in which there is the least shadow of suspicion, to one of the laboratories for a report. Upon the bacilli being found it seems almost useless for me to say that the patient must be pro-

vided with a bed in which he can sleep alone, and if possible be the sole occupant of the room; not only for the patient's benefit, but also to protect the other members of the family from the disease. If my attention had not been called to this point a short time ago, when I saw two young girls occupying the same room and bed, one being in the last stage of phthisis, the other seemingly well, it would be almost superfluous, at this date and with our knowledge of the disease, to touch upon this subject.

The habit of kissing, which is so often resorted to between members of the famly and the invalid, is most dangerous, and should be absolutely prohibited.

Care of Sputa, Handkerchiefs, and Clothes of Patient.— It is well for the patient to have an antiseptic solution with which he can rinse out his mouth several times a day. Not that the bacilli can thus be destroyed, but in the hope of removing any bacilli that may have lodged against the teeth or the sides of the mouth. The greatest attention should be paid to the care of the sputa, which should be received in one of the sputa cups, of which there are a great many on the market. I prefer the paper cups that can be burned to the pocket sputa flasks which have to be sterilized each day after use. The pocket sputa flasks are very good for patients in a sanatoria, as they are taken charge of and thoroughly sterilized, but with patients at home I find generally that they will not and often can not sterilize them; so I much prefer their using the paper cuspidors, which must be burned.

When taking exercise away from home, such as walking or driving, I advise expectorating into cheesecloth, which is put into an oiled silk bag. On the return home, after the contents are burned, the bag is thoroughly wiped out with an antiseptic solution. I recommend the use of cheesecloth in the place of the handkerchief for the nose and mouth, as it can be burned. Of course, in institutions all linen can be thoroughly sterilized before it is washed, but at private

homes my experience is that the bother of doing this thoroughly is so great that patients and their families become careless; therefore I think it best to destroy by fire everything possible that comes in contact with the sputa or mouth of the patient.

Ventilation of Apartments.—Under the care of patients I laid particular stress upon the ventilation of the apartments in which they live, and I only wish now to call your attention to a point or two. Do not be afraid of the night air. Insist upon having the room as thoroughly ventilated by night as by day; and, in winter, by all means have an open fire. With a stove it is almost impossible to control the heat.

Several years ago, in the White Mountains, I had under my care during the summer a poor girl suffering from phthisis. Some philanthropic people raised a sum of money to send her South. The amount was not sufficient to procure other than poor accommodations, and as her home was a New England farmhouse, with every room heated by stoves, I advised her to use the money in building for herself a good, airy room with a large wood fireplace. She did so, and I was much pleased on my return the next summer to find that she had greatly improved. She continued to gain, and has been well now for some six years.

Food and Nourishment.—Equally important with ventilation come food and nourishment. Some years ago it was the custom to give food every few hours, and it was considered most important that the patient should have food frequently. Then, a few years later, it was considered advisable to give the patient only three meals a day and nothing between times. My experience has been that we can not follow any set rule, but each case must be studied separately. What we want to aim at is to give the patients as much nourishment as they can assimilate. I think it is always well to have something hot for the patients to take when they awake in the morning, before they get out of bed,

as a glass of hot milk, or cocoa, or beef tea. I prefer a glass of milk and vichy; however, it is not of enough importance but that we can leave it to the palate of the patient.

There are two advantages to be gained by the patient taking warm nourishment upon awaking. First, it loosens the mucus and enables it to be raised more easily; second, it strengthens him so that he experiences less fatigue from dressing. If the patient's stomach will stand it, it is wise to give him three meals a day and something between the meals and upon going to bed. But if there is the slightest sign of distress of the stomach, we must take care of and rest it by not requiring so much work of it. In regard to the kind of food, I much prefer those that are prepared fresh, in one's kitchen, to those manufactured, though I do not wish to be misunderstood, as I appreciate fully the value of the laboratory foods and have seen a great deal of good accomplished by many of them, with which you are all familiar. I am partial to milk, in the natural condition, or if necessary with lime, barley, or vichy water. I try to have a patient take from a quart and a half to two quarts a day. Less than that will do no good. I consider eggs next in importance to milk, and I advise taking four a day. It is immaterial whether they take them boiled, poached, or in sherry; I do not approve of them fried nor do I allow any fried food. Roast beef, beef steak, mutton, lamb, turkey, or chicken, with vegetables, should be given with enough variety so as to tempt the appetite. Plain pudding or fruit may be allowed for dessert, but pastry should be discouraged. I do not agree with the German physicians in advocating the use of wine or beer with the midday or evening meal. I consider the patient is better without them, and I allow whisky only when for some cause the patient becomes extra fatigued or needs a stimulant. I do not think its regular use will be productive of any good results.

Rest and Exercise.—I now come to the last one of the trinity—air, nourishment, and rest. We have considered

the first two, and I deem rest equal in importance to air and nourishment. While there is any fever, it is necessary to keep the patient in the reclining position. For this we will find the wicker reclining or steamer chair most comfortable. But should the patient not be able to afford this luxury, then a couple of armchairs will answer the purpose very well—one to sit in, and the other tilted to hold the feet. After the fever ceases exercise should be encouraged, particularly such as will expand the chest. The breathing tube, which admits of pulmonary gymnastics, is of special value. I find that most patients are apt to overdo, hence you must prescribe not only the kind of exercise, but also just how much should be taken, as a great deal of harm comes from over-fatigue. We should always warn them to guard against getting tired. Walking, horseback riding, golf, bicycling, are all good for selected cases, in moderation.

Medication.—We have no specific for this disease. If one has followed the literature of the past twenty years, and has seen the numerous drugs and methods of treatment that have been advocated by excellent minds and endorsed and lauded by the leading men of the time in the profession, it will convince him how well we all know that drugs are of little value and how anxious each one is to give the patient the advantage of some new drug or treatment before its efficacy has been tested. Tonics and medicines that build up the general system have their uses, and as symptoms present themselves of sufficient importance for treatment we are called upon to prescribe. Of the numerous tonics I have had excellent results from iron, strychnia, and arsenic. I almost consider malt and cod liver oil a food, and have found very few patients who could not take malt and cod liver oil when mixed in suitable proportions. When we have a great deal of dyspepsia to contend with, it is necessary to try and control it with diet, which might be assisted by drugs.

The different forms of dyspepsia which occur in phthisical patients are so varied that it would be impossible in an article of this size to do more than say that each form must be treated according to the symptoms presenting.

Cough needs no treatment unless it is so bad as to disturb the rest of the patient at night. In that case we are obliged to use one of the preparations of opium, and it devolves upon us to select the one which is the least apt to disturb the patient's stomach. Codeine and heroin have in my hands served the best purposes. All cough mixtures are an abomination and only disorder the digestion.

When the general health improves and the lungs heal the cough will cease, and not till then.

When can We Consider a Patient Cured?—It is very important that we recognize a condition when the patient is, to all intents and purposes, cured and able to mingle with his fellow-men without danger of infecting them.

When the patient has had no fever for six months and the cough has ceased, and upon repeated bacteriological examinations we fail to find the bacilli, I think we can safely consider the patient cured.

It is also very important that we should educate the public to know when there is no danger of contagion.

This would do away with an unreasonable fear of the disease, or of those who have had it, which prevails in some sections.

The following case which came under my care will illustrate this point: A patient who had been under treatment for six months had improved so much that he had gained twenty pounds in weight. He had been without fever, cough, or expectoration for two months and the chest had quite cleared up. What little expectoration could be secured I examined repeatedly for bacilli and failed to find them. He returned North and was pronounced cured by his physician, who is one of the best-known specialists in the East. In spite of all this his employer would not allow him to return, but preferred to pay his board at a summer resort rather than have him around his stable.

The After-care of a Patient who has once had Tuberculosis.—It is necessary that he should always live in good, airy apartments and have plenty of fresh air both day and night. He should endeavor to obtain an occupation that will keep him out of doors. His system should always be kept up to a high point, for he has demonstrated, by his first attack, that he has the suitable soil, and we all know there are numerous bacilli in the air of most buildings and conveyances in which the patient is forced to go. He will find whenever he allows his general system to become run down he places the greatest strain upon the weakest part, and that is the part that will first give way.

Hence it is imperative that a patient once having had pulmonary phthisis should always take care of himself and should be very watchful for any signs of failing health.

Dr. Beverly Robinson, in the St. Louis Courier-Journal, has sounded the keynote of the after-care of pulmonary patients when he says "Legislation should make it imperative that the tenements, workshops, and apartments of the poor should be so constructed that they would get plenty of sunshine and fresh air."

Take a consumptive who has been cured and send him back to live and work in a dark and ill-ventilated apartment, and he will soon fall victim a second time to the white plague.

II. FORMALDEHYDE AND ITS SALTS IN THE TREATMENT OF TUBERCULOSIS.

By H. C. HOWARD, M. D.,
CHAMPAIGN, ILL.

Two years ago, when this Association met in Chicago, I had the pleasure of discussing the paper read by Dr. Thomas. I then stated that we had a medicine which, given by the mouth, would effectually limit and control the growth of the bacillus of tuberculosis.

I now propose to present proofs to the Association that my statement of two years ago was founded on fact.

I should have presented this at the meeting last year had it not been that the microscopic slides illustrating the fact were destroyed, and that at that time it was too late to procure new ones.

At this time I shall give you not only proofs in the way of photographs of sputum illustrating the action of the medicine, but will cite cases and also give my experience regarding the limit and the dangers of this method of treatment.

Formaldehyde gas can be used successfully only by inhalation. In order to be taken into the stomach with impunity it must be too largely diluted to be of much effect, and in addition it at once unites with the secretions of the stomach or its mucous coating, which renders it very slowly soluble, and this only after decomposition, thus preventing its germicidal action.

"Ammonia formal" is the agent that is most generally in use and is the most to be relied on by reason of its germicidal action. The gas is used as a germicide for the lungs and as a disinfectant for the mouth and upper air-passages. It is ordinarily employed with alcohol and chloroform, in any simple inhaler, or mixed with water and a little suitable perfume in a large-mouthed bottle. The small inhaler is preferable in most cases.

The aqueous mixture found to be most satisfactory is the following:

℞ Formaldehyde (40 per cent.), ... ℥ii;
Chloroform, ... ʒii;
Oil rose geranium, ... gtt. xx;
Water, ... q. s. ad. ℥viii.
M. Sig. Use with inhaler.

This mixture can be used with any ordinary inhaling bottle. I frequently employ a small, wide-mouthed bottle for this purpose. The mixture may be inhaled freely. So much relief is often experienced that the patient is disposed to use it too freely, thereby causing some irritation of the air passages.

The alcoholic preparation is made as follows:

℞ Alcohol, ... ℥iss;
Chloroform, ... ʒi;
Formaldehyde (40 per cent.), ... ʒii;
Oil rose geranium, ... gtt. xx.
M. Sig. Use with inhaler.

The mixture in this strength may be employed, as a rule, without any discomfort from an open-mouthed bottle, or from a small hand inhaler.

These preparations are used only as an adjunct to the main treatment, to keep the mouth and throat disinfected. The formaldehyde is absorbed to a slight extent, but not in sufficient amount to be very efficacious except as regards soothing and healing the abraded mucous membranes of the air passages.

Ammonia formal is the remedy which I have found to be of the greatest benefit in tuberculosis. It is readily absorbed, passing into the circulation unchanged, remaining in the blood as such and then passing off through the kidneys, partially decomposing in the presence of tuberculous matter or of pus organisms, when the formalin is set free and is expelled in the form of gas through the lungs, where it can readily be detected by suitable tests. It perfectly disinfects the alimentary tract, very largely increases the number of

leucocytes at any diseased point or where there is local congestion, more especially where there may be a growth of the bacilli of tuberculosis or of pus. It controls the formation of pus almost instantly at any point, even in an abscess or in traumatic sepsis.

In tuberculosis of the lungs this agent appears to have an exceedingly rapid and marked effect, causing speedy relief, and in a few hours markedly diminishing the amount of expectoration and wholly changing its character, as will be seen from the photographs here submitted of sputum of patients before and after using the medicine.

It soon renders the affected part completely immune and checks the disease-process. When employed in the first stages of the disease, it soon covers the affected area with a firm envelope, which is complete in the course of a few days. The medicine is then continued in smaller doses in order to secure asepsis until the patient has regained his usual health.

The size of the dose varies with the patient and with his condition. In cases in which treatment is commenced early in the disease full doses may be given, commencing usually with five grains every four hours for three or four days, when the dose is increased to ten grains. If the full effect is not then apparent, fifteen grains may be given, but in a few hours, as a rule, the full therapeutic effect will be apparent.

When the sputum is found to be free of the bacillus the small dose is sufficient, but if this does not occur in ten or fifteen days the dosage is increased until the condition of immunity is attained. When the full therapeutic effect has been obtained, toxic symptoms will soon follow unless the doses are decreased.

The toxic action will be recognized by a subnormal temperature, a slowing of the pulse of twenty or more beats, together with a feeling of great depression. These symptoms, while not especially dangerous, give warning that the limit has been reached. Following or even preceding this condi-

tion there may be local irritation of the bladder, with occasionally a slight hematuria, which will pass off in a few hours, or can be quickly overcome by the use of strychnia hypodermically. Strychnia appears to be not only an almost perfect antidote to the toxic effects of the drug, but also seems to increase its therapeutic action.

In tuberculosis of glands or of bones and joints the use of this agent in a fifteen or twenty per cent. solution is most effective. After evacuating the abscess the cavity is filled with the above solution, which is retained by a suitable dressing. By this means the germs in and about the cavity are destroyed and the solution combined with the gelatinous or fibrinous parts about the cavity, which soon becomes filled by an indurated mass. An aseptic body is thus formed, which is slowly absorbed, giving off in this process the formalin that has united with the gelatinous tissues, while the gelatine itself forms a framework for the reconstruction of the destroyed tissues. It rapidly admits of the extension of blood vessels through the mass, which soon disappears.

Very rarely has a second injection to be given, and so far as my experience goes, never providing the medicine has been given at the same time by the mouth.

In the early stage of tubercular disease of the glands the hypodermic injection of a few drops of a five-per-cent solution will cause the gland to assume a natural appearence in a few days. By the same means small abscesses may be aborted.

CASE I. Mrs. M., age 60. Patient's family history was good as regards parents, but her husband and five children had died from tuberculosis within the last six years. When I first saw her, in April, 1901, she was in an advanced stage of the disease. There were two cavities in the left lung and three in the right. All the lung tissue was involved; she was much emaciated, with defective nutrition, complete loss of appetite, constant cough, profuse expectoration—often amounting to a pint and a half in twenty-four hours—with an evening temperature varying from 100 to 103 degrees, and inability to articulate more than two or three words without pausing to draw breath. She was confined to bed.

Five grains of ammonia formal were given every four hours, alternating with one sixtieth of a grain of strychnia. The first dose was given at 8 a.m., and the following night she slept better than she had for a month. She coughed only twice during the night and the expectoration was less than four ounces for the day. She expressed a desire for food on the third day and two days later was sitting up and said that she was going to get well.

The sample of sputum obtained on the fifth day of treatment was almost free from the Koch bacillus. On the seventh day it became necessary to suspend the medicine, as it was causing a too rapid walling off of the infiltrated portion of the lungs, and masses from the interior of the cavity were thrown off with some saneous expectoration, accompanied by faintness after a fit of coughing. The next day the medicine was resumed, being given three times a day, and was now well borne. Strychnia was given in double doses for a time, followed by strong tonics and hyper-alimentation.

Sample No. 3 was taken twelve days after commencing treatment, in which there are but very few of the bacillus and very few of the pus germs.

At present the patient is able to do the little work required about her room, and to pay an occasional visit to friends.

CASE II. Mrs. H., age 63. A finely developed, muscular woman with a good family and personal history. She had an attack of la grippe in September, 1900, and came under my care in May, 1901, at which time the whole left lung was solidified, with beginning softening of the fibrous infiltrate and with a small cavity at the apex. The sputum obtained at this time was obtained several days before treatment was commenced, as the patient when first seen was having a severe hemorrhage, which was extremely difficult to control as she was of the hemorrhagic diathesis. At this time she had a severe pain referred to the bifurcation of the trachea, with a very unusual sound on auscultation, the result, as was afterward shown, of an abscess formation at that point. This soon opened spontaneously and proved to be a suppurating gland and was demonstrated to be the point from which the hemorrhage had taken place. The ammonia formal was exhibited in small doses, as her anemic condition contraindicated its too free use. She is still using the medicine once or twice a day, is on tonic treatment and is now able to attend to her household duties and considers herself well. During the last month she has gained flesh rapidly.

CASE III. Mrs. T., age 29. Was the last of a family, all the other members of which had died from tuberculosis. She herself was suffering from tuberculosis of the larynx in an advanced stage, with pronounced involvement of both lungs. The epiglottis was the seat of tuberculous infiltration for two thirds of its extent and there was ulceration of the glottis so that she was almost unable to articulate. She had an evening temperature of 103 to 105 degrees and a morning temperature of 100 to 101 degrees. She complained of complete loss of appetite. Not with any hope of curing her, but in the endeavor to give her some temporary relief, she was placed on small doses of ammonia formal and strychnia. She was told that while the diseased condition in the lungs could be controlled, that the healing process in the throat would involve a progressive contraction which would proceed more rapidly even than the contracture following a burn. She was given two and a half grains of the medicine every four hours during the day, and in addition one sixtieth of a grain of strychnia every four hours; she was also furnished with the inhaling mixture, of half the usual strength. The result of this treatment was excellent; the condition of her lungs improved; she had some desire for food, and gained strength. As the condition of her throat was not improving as the patient thought it ought, she decided to increase the dose of the medicine to five and then ten grains, with the result that after three days a line of demarcation formed in the epiglottis, which had heretofore assumed a bright pinkish color, indicating a return of vitality in the diseased mass. The chink of the glottis was also walled off and soon came away, leaving a healing surface. The epiglottis lost two thirds of its length, with the result that she could not swallow and could breathe only with difficulty and even then with a whistle so loud that it could be heard in the next room. This condition increased until death relieved her from her sufferings.

Remarks. In this case I had an excellent opportunity to see the action of the formaldehyde. Under its use the epiglottis assumed a bright pink hue, very much brighter than the adjacent parts, and this extended slowly into the tuberculous portion. Had the medicine been taken as ordered I believe that this condition would have extended nearly to the tip of the epiglottis, but the large amounts taken contrary to orders caused the line of demarcation to

be formed lower down. The last part of the process I watched very closely but could not arrest as it had extended too far, the tip having commenced to become dry but not offensive.

This case was very instructive, as the diseased area was plainly in view. I have observed the same condition in several other cases where less extensive disease existed. A similar action takes place in all cavities, either of the lungs or of the glands, or at any point where the mass is so infiltrated that there is not sufficient vitality remaining to assist the tubercular mass and still have space left for circulation to be carried on as in health.

CASE IV. Miss H., aged 38. She had a poor family history, as her mother died from tuberculosis when the patient was seventeen years of age. In June, 1897, the patient had an attack of la grippe and was treated with Koch's serum for three months. She at once developed tuberculosis of the right lung, and when she came under my care, in January, 1898, was supposed to be in a dying condition. At the time of the first examination she had a morning temperature of 101° and evening temperature of 104° a pulse of 130 and respirations 35. She had numerous abscesses in the right lung, larger in the lower lobe, had an almost constant cough —which was treated with codeia, in full doses; diarrhea; tympanitic abdomen and marked emaciation; she expectorated profusely and the sputum was loaded with tubercle bacilli.

The patient was put on the inhaling mixture, with small doses of ammonia formal and strychnia, and iodine and oil was applied twice a day to the entire surface of the body. After a few days of this treatment the patient rallied; she continued to improve and was soon able to resume her usual avocation. She was relatively well throughout the summer of 1898, but as she had been advised to spend the winter in the South she went to Garden City, Kansas, instead, and was there exposed to a December blizzard and contracted pneumonia. On her way home she stopped at Kansas City and at Eureka Springs, Arkansas, and finally reached Champaign in February, having lost all the ground she had gained during the spring and summer.

On examination at this time the left lung was found to be somewhat involved. She was again placed on treat-

ment, and in about six weeks was in relatively good condition. She passed the summer of 1899 at home, feeling as well as a person with only one active lung could. In the fall she came to Chicago and in November fell, fracturing a rib on the right side over a large cavity which had not yet fully healed. This accident was followed by an acute inflammation, with a gangrenous condition supervening. She improved so that she was able to be on the street again in December, when she had another fall, fracturing the eighth and ninth ribs, the end of the eighth rib penetrating the lung cavity and producing some hemorrhage, as shown by the sputum, which soon became offensive. She was removed to St. Elizabeth's Hospital, where she was seen in consultation by Dr. J. B. Murphy, who pronounced the case hopeless on account of emphysema and gangrene of the diseased lung. During the next four weeks she expectorated most of the remaining part of the right lung and nearly all of the old cicatricial tissue remaining from the previous attack. This lung tissue was found to be filled with encysted tubercle bacilli in bundles and rods, but fully covered and non-toxic, as shown when placed in culture media.

From this attack she fully recovered and gained her usual weight, passing the summer and fall in active life on her stock farm. In November she came to Chicago and remained until late in February, when she had an attack of la grippe, with rapid extension to both lungs and later on followed by gangrene of the left lung.

The sputum was frequently examined during the last three years and was almost entirely free from the bacillus, which was often not found for months. During the last illness the sputum was examined daily with identical results.

Remarks.—This case is reported to show how nearly the use of the formaldehyde of ammonia will render a patient immune to tuberculosis, keeping her alive for more than three years, during which she had other serious complications, the patient ultimately dying from some other disease.

CASE V. M. P., aged 17. The patient was small for his age and had worked very hard on a farm since his early boyhood. In February, 1898, he had an attack of diphtheria followed by la grippe. He came under my care in April, 1898, when I found the left lung solidified throughout, with very little expectoration and slight cough. He was put upon the formaldehyde gas treatment and the first inhala-

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tion caused cough and a profuse expectoration of tough, mutinous, sputum which contained a few tubercle bacilli. This showed that the patient was in the early stage of tuberculosis following la grippe.

About this time he was examined by a Chicago physician, who said that the patient had about three weeks to live. Three weeks later he was at his father's house, and was again seen by the same physician about six weeks after. At this time he had so greatly improved that the physician did not recognize him and after a thorough examination he declared the lung to be in very good condition. The boy is to-day of ideal physique, weighs from 190 to 200 pounds, and does his work on the farm.

This case was among the earlier ones I treated, at a time when the formaldehyde of ammonia was handled with great care, but the results show that the small doses of the drug, together with the free inhalation of the gas, was the correct treatment.

CASE VI. Master K., aged 8. Small, poorly nourished child, a victim of hip disease of long standing, with a limb two inches short, but healed for one year previous to the present attack, which is in the upper end of the lower third. Abscess commenced about one month previous to treatment. Abscess opened with a small trocar. Pus filled with bacilli. Cavity washed with normal salt solution, followed with peroxide hydrogen and water, then ten grains of the salt was dissolved in one ounce of water and injected in the cavity and retained with suitable dressing. In three weeks this boy was discharged without further injection or treatment of the wound.

Conclusions.—In tuberculous conditions of the lymphatic system a similiar condition exists, and in such cases the full action of the medicine can be easily followed The gland, if open, assumes a pinkish color in the cases where the mass of the disease has sloughed off. The diseased mass will assume a grayish color and will soon slough off like a scab.

The medicine acts by being absorbed as a formaldehyde, remaining in the circulation as such and being found in the urine in that form; while to all appearance it is decomposed in the presence of, or on contact with, the bacillus of tuberculosis. This is demonstrated by the fact that free formalin gas is given off by the breath in all cases where pus is present,

but the action is more powerful in the case of tuberculosis than in other bacterial diseases. In tuberculosis the odor of formalin can be detected in a few hours after its use has been commenced.

In the first stage of tuberculosis full doses are given and continued until the full physiological effect is produced, when it is partially withdrawn and tonics and supportives are administered.

This treatment can be readily carried out at the home of the patient, but the most satisfactory results are obtained when the patient can be under the care of a competent nurse at a sanitarium or hospital, where all the known appliances can be employed to build up the patient after the disease is under control.

In tuberculosis of the lymphatic glands, when they can be reached, a hypodermic injection of a solution of the remedy, thirty grains to the ounce, will abort the disease and restore the gland to its natural condition. As a rule one injection is all that is necessary.

In tubercular disease of the bone the same treatment is carried out, the tuberculous cavities being filled with a solution of the drug. This injection may have to be repeated, as the diseased tissue is so solid that one treatment may not penetrate to the full depth. Under these circumstances a hardened mass is formed, like a tumor, which is gradually absorbed.

In tuberculosis of the bowels the diseased glands disappear quickly and nutrition is soon restored.

In tuberculosis of the ovaries the remedy acts very promptly, and as a rule four weeks' treatment is sufficient for the process of recovery to be well established. By taking only one or two doses a day this result is obtained.

In all the cases in which the medicine is employed there is a prompt improvement of appetite from the beginning.

The danger limits in this treatment are reached when the pulse rapidly diminishes, the temperature becomes sub-

normal and the patient complains of feeling weak and faint. If the medicine is still continued the patient may actually faint. The symptoms are quickly relieved, however, by the free hypodermatic use of strychnia, and the bladder symptoms vanish under full doses of diuretics and an alkali, such as lithia, sodium salicylate, and the like.

The action of fomaldehyde of ammonia, so far as can be determined by tests, is about as follows: It is absorbed and remains unchanged in the circulation until it meets with some substance in the blood which causes it to decompose, the formalin uniting again with the gelatinous constituents while the ammonia forms new combinations.

We know that this substance passes into the bladder unchanged and it is found also in the perspiration, as has been demonstrated by tests. One method of testing its decomposition is to add a solution of the salt to pus, whereupon formalin is soon given off in perceptible quantities; the pus is changed in character, the germs are destroyed, and the mass is rendered sterile.

By the action of this substance on the lungs the pus cells are soon eliminated from the sputum, as are also the bacilli of tuberculosis.

It acts directly on all forms of bacteria, but most markedly on the pathogenic varieties. Excessive dosage, however, appears for a time to suspend all bacterial action; in fact, this is all we know at present of the mode of toxic action of this agent. This condition has been produced in a few cases, but it is also found that stimulation with strychnia and alcohol promptly relieves all dangerous symptoms.

The size of a toxic dose varies with different individuals and conditions. I have noticed toxic effects after twelve five-grain doses of ammonia formal in a boy twelve years of age, while a medium-sized man took one hundred and twenty grains, by mistake, within five hours without toxic effects. In non-tuberculous individuals, or in case of slight pus formation, the bladder is quite easily affected and large

doses can not safely be administered, while a patient in a septic condition will tolerate much larger doses and a much larger aggregate amount without a sign of urinary complication.

In all cases the full tonic treatment is employed, varying, of course, with individual cases. I place the most reliance on the free use of strychnia, the hypophosphites, alcoholic stimulants, and inunctions of iodine and oil daily, together with the employment of all hygienic means at hand.

Expectorants are entirely excluded, as they are hurtful. Out-of-door exercise is insisted on in all cases and in all weathers. No change of climate is advised until the patient is able to care for himself, and then only to hasten the rebuilding of the wasted energy. Patients who expect or wish to continue their residence at one point will find that to be the point where they will regain their health.

In the last six years I have treated about three hundred cases of tuberculosis by this method, with a mortality of less than ten per cent., and am led to believe that all uncomplicated cases should recover when treatment is begun in the first stage; that a very large percentage of patients in the second stage should recover, while of those in the later stage many can be made to live for years even when parts of one or both lungs are gone.

DISCUSSION OF PAPERS BY DRS. McGAHAN AND HOWARD.

Dr. C. H. Hughes, St. Louis, Mo.—So far as the prophylaxis of tuberculosis is concerned, I agree with those writers who urge the necessity of treating bovine and human tuberculosis as if they were identical—that is, from the practical standpoint of hygiene. I think Koch once maintained the identity of human and bovine tuberculosis, but that position having been challenged, he has promulgated a second paper denying the identity of the two. The practical point I wish to make is this, that the condition of tuberculosis is accompanied by suppurative inflammation. It is a toxic process and

detrimental to the human organism, and it is immaterial whether the individual gets the suppurative process established in his system from human or from bovine tuberculosis. Both of these sources of infection ought to be avoided. As sanitarians, it is our duty to protect the public against all sources of disease, bovine as well as human. The attitude of sanitarians on this subject should not be changed, nor should the public sense of insecurity be relaxed, especially at this time, when they are just awaking to the fact that the dissemination of tuberculosis infection from cattle is a very serious source of danger. Varioloid and variola are known to be markedly different from each other, though similar, yet we avoid both—one is the cow disease and one is the human malady. There is danger of the public being sanitarily harmed by the spread of erroneous views on this subject, and I think we ought, in all our discussions, to say nothing that may cause the public to believe in the impossibility of receiving the infection of tuberculosis from the bovine form of the disease.

DR. EMIL AMBERG, Detroit, Mich.—I would like to call the last speaker's attention to the percentage of cases in which sequelæ of tuberculosis have been found in post-mortems. They range from 50 to 90 or more per cent. if I remember correctly, while it is supposed that 12 to 15 per cent. of all people die of tuberculosis. My object in calling attention to this is to justify the estimate of Dr. Baker, of Michigan, who has been accused of being extravagant in giving the average as possibly amounting to 72 per cent. for the number of cases in which sequelæ of tuberculosis have been found. Might it not be justifiable, therefore, to assume that nearly everybody gets tuberculosis of one sort or another during his life, but that tuberculosis being one of the most curable diseases in its incipient stage, most of us get over it without developing any pronounced symptoms. The danger of getting the disease is certainly great, but tuberculosis is not necessarily a fatal malady, and all those sanitary precautions that have recently been taken tend to lessen the evil. In this respect tuberculosis is one of the greatest sociological factors of our time, and some one has even gone so far as to name Koch a second Christ.

DR. H. B. WEAVER, Asheville, N. C.—I rise mainly for the purpose of emphasizing what the author of the first paper has said. In the treatment of tuberculosis I consider a reliable tripod to be diet, hygiene, and thorough medication. The doctor rightly said in regard to nutrition that milk and eggs are the most important of the food elements, because of

the fact that they are both complete physiological foods, containing all the fats. In my experience and practice I find that nothing is so valuable as these two articles. If we can get the patient to take a sufficient quantity of these, the battle is half won in the treatment of tuberculosis, especially in the first and second stages. They should take two or three pints of milk and ten or fifteen eggs in addition to beef juice. In regard to starchy foods, I find that many patients can not take ordinary white bread because of the yeast used in making it, which has a tendency to cause the bread to turn sour. Such patients I put upon Graham bread, which I find they can digest much better than bread that is artificially prepared. In regard to rest and exercise I think the doctor said that when the patient has fever he should rest. That depends. I suppose he meant when he has a temperature of 99.2° or 99.3°. My experience has been that it is not detrimental for a patient to take moderate exercise until the fever gets to 100°. Then I put him to bed, and keep him there until the temperature gets below 100°. But the main idea is open-air treatment. Keep your patient out of doors. If they can not walk, let them ride, or let them sit or lie on the veranda—keeping them in the open at least eighteen hours out of the twenty-four. In regard to medication, I would like to take issue with the doctor. I have seen some good results from specific medication. I myself have had good results from serums, more especially from a watery extract of tuberculin manufactured by Van Roche. I believe, however, that good results may be obtained from different serums, including Koch's old tuberculin, if it is properly used; but it is necessary to use great care, or it may result disastrously.

DR. B. T. WHITMORE, New York.—I followed with a great deal of interest the minute details given in the doctor's paper in regard to the general routine treatment of tuberculosis. We have had every year a number of papers upon this subject, but I do not remember having heard one which gave so much information of a practical character. I agree with previous speakers that we are much indebted to Dr. McGahan for preparing it. I had the pleasure of listening to Koch's paper at the recent Tuberculosis Congress in London. Before it was read a sufficient number of copies of the paper had been distributed to enable every one to follow it closely. It undoubtedly attracted a great deal of attention, but at the close the general sentiment was voiced by a remark I heard, "Well, he has fired his rocket." The fact is, it was not received at the time quite as his friends expected it would

be, nor did it call forth the thorough and exhaustive criticism that could have been wished. Koch was invited to remain for the discussion next morning, but he did not do so. He had fired his rocket and gone away. One thing outside of the congress, though related to it, deserves to be mentioned. The Houses of Parliament were in session, and they had before them a measure in regard to the best way of disposing of tuberculous cattle. Some one made a motion that the measure be tabled, as Koch had rather settled the question by showing that tuberculous cows after all were not very bad so far as the public health was concerned. This motion was not adopted, but, instead, steps were taken which have since led to the appointment of a royal commission to investigate the whole subject of the connection between human and bovine tuberculosis. The measure referred to, I may add, provided incidentally for the payment for cattle that were condemned. In New York we pay for all the cows we kill on account of this disease, and if we did not, it follows that the dairymen would not want us to kill them. In regard to Pasteurization, I would like to make just this one remark, that it seems pretty well established that there is a toxine in the milk that is not got rid of by that process of purification.

DR. JOSEPH MCFARLAND, of Philadelphia, Pa.—I am sorry I was not here in time to hear the first paper. I was, however, very much interested in that of Dr. Dickey, and I was glad that Dr. Amberg, of Detroit, quoted a number of statistics to show him the frequency with which tuberculous lesions are found at post-mortems. In the two hundred autopsies I have made during the past six months I found that some tuberculous lesions were present in nearly every case. It would therefore seem that almost every one becomes infected with tuberculosis at some period of his or her life, although the disease in many cases does not develop to any important extent.

DR. HOWARD (closing the discussion on his part).—Formaldehyde acts by destroying pus and suspending all bacteriological action. For a long time I had been looking for a salt of the drug that would have this effect, and finally I found it on the market under the name of urotropin. I have had a large percentage of recoveries from the use of this drug. In regard to the use of serums, I would only say this, that I have seen one case, and reported it, in which tuberculosis was produced by the use of tuberculin, the result being that the patient lost one of her lungs.

DR. PAUL PAQUIN, of Asheville, N. C.—(who had occupied the chair during the symposium on tuberculosis)—I should

like to say a few words in regard to the three interesting papers that we have heard read and the discussion that has ensued. To Dr. McGahan's paper I have practically nothing to add. It consisted of valuable suggestions as to what is necessary in outdoor treatment, and that is what we are all most interested in. Most tuberculous patients are too much afraid of fresh air. It is all very well for them to avoid draughts, but it is one of the greatest mistakes possible for them to have too little fresh air. There is much greater danger from a vitiated area of atmosphere than from being exposed to fresh air of any kind, even if it rains or snows. Windows should be open day and night all the year round. With reference to the transmission of infection in health resorts, it can not be denied that it takes place very frequently. In fact, there are very few places where the disease has not been carried by the patients at resorts and in every center of congestion of people. The result is that local laws are being passed in many places to prevent the introduction of tuberculous patients. I do not think there is any question at all about its being thus transmitted. The germs, it is true, are killed in five or six or seven hours if exposed to the open air; but they are not killed in that time in a room. In other words, the danger is not so much on the streets as in the hotels and boarding-houses. In Asheville, N. C., a very popular resort, sanitary laws exist to enforce the disinfection of rooms and hotels. As to medication, one speaker has said that whisky predisposes to tuberculosis, and that the avoidance of whisky will do much to facilitate a cure. I wish that were altogether true; but the fact is I have seen patients seemingly get well on whisky and nothing else, and that too after trying almost every other remedy. In these cases, very limited in number, it seemed as if nothing else would do. It is possible that it may have made drunkards of the patients, that their condition was a false rousing of the forces, and therefore that they would have been almost as well dead; but that is another matter. As to specifics, I agree with the statement that we have not yet found a positive one. However, I think that we are not justified in denying the merits of specific remedies as far as they go. Specific medication in germ diseases is the thing to look for. But we have no remedy as yet that can be pronounced a sure remedy in every case. If tuberculin is to be successful, it must act as a vaccine. If it has not the merit of creating a reaction, as a vaccine it is of no value. That is the only purpose for which we use toxins or the virus that produces them. Tuberculosis and diphtheria are very different diseases. For

instance, to mention only one difference, in diphtheria there is usually only one germ, while in tuberculosis there are generally many. Indeed, a hundred different kinds of bacteria may have to be dealt with in treating a case of tuberculosis, for there is hardly ever a case that is not a mixed infection. Antitubercle serum is within the lines of natural law just as clearly as diphtheria antitoxin, for it is an antitoxin and as such it has cures to its credit in every form of climate in this country. But a mixed infection, as tuberculosis generally is, must be dealt with besides by measures affecting all the complications. It comes to this, then, that we can not reduce our treatment to any one or two or a tripod of remedies. We must take everything relating to the patient into consideration, and pursue a course of general treatment more or less on the lines laid down by Dr. McGahan and all broad-minded authorities.

DR. MCGAHAN (closing the discussion on his part).—The first point I have to mention relates to formaldehyde. I had a little experience with it, but never had anything like the success described by the doctor who spoke on this subject. On account of its great value as a disinfectant, it occurred to me several years ago that if I could fill my sanatorium with the gas of formaldehyde I would be getting at the solution of the whole thing. I found, however, that the slightest amount of that gas was such an irritant that my patients had to get out as quickly as possible, and I had to have the place thoroughly aired. And yet I used only a very small quantity—certainly not enough to kill the bacilli—and it seems to me that if I did use enough to kill the bacilli it might kill the patients too. So also, when the respirator was used, I found it of no use. Any fluid strong enough to kill the bacilli would destroy our throats, and I am convinced that the only use of respirators is as aids to pulmonary gymnastics. That is so. But tuberculous patients are very apt to throw out a little mucus in coughing. It is true the breath does not convey the bacilli, but a little of the phlegm that comes with it may do so. As to heredity, he said it existed in a few cases. I think, on the contrary, that it is generally recognized that there is no such thing as heredity in tuberculosis. We have got to have three things—a suitable soil, the right atmospheric conditions, and the germs. What we get from heredity is a weak constitution, which provides the suitable soil. The patient then inherits the suitable soil, but he does not inherit the consumption. The doctors have asked why it is, if tuberculosis is so contagious, that there is no great increase of the disease at Brompton, Asheville, and other

places where large numbers of tuberculous patients are gathered together. The answer to this is that at Brompton and the other places referred to such care is taken with regard to the sputum and other possible causes of infection that there is practically no danger of the disease being conveyed from a patient to any one else. So it is here. Lately, in my own part of the country, I had a lady patient who coughed a little, and fears were entertained that other members of the family might catch the infection. I said I would take her up to my sanatorium, and when she went there with me I showed her that there was no danger of infection because of the precautions we take. I myself, when at home, take my lunch every day at the sanatorium, and I have not the slightest fear of it. As to the local people in the town, about whom questions have been asked, I may say that I made inquiries with reference to the employes of the hotel at Aiken, and I found that a great many of them had developed tuberculosis, and that over half of the chambermaids, washwomen, and bell boys had died of it. The greatest mortality it appeared was among the washwomen, those who came in actual and close contact with the clothing of the tuberculous patients. As for the people in the town, they generally have too much sunlight and fresh air in these mountain health resorts to run much risk of infection. One of the other speakers referred to the subject of rest. I keep my patients in a reclining position, not necessarily in bed, whenever they have any temperature. I do not let them take exercise when the temperature goes to 100°. When it goes up to 99.5° and no higher I allow a little exercise in the forenoon—in fact, as long as there is evidence of inflammation going on I am afraid of exercise, and I take the precaution of making them rest. Reference has also been made to different serums and to tuberculin. I have tried them all, from Koch's tuberculin onwards, and including Von Ruck's, Shirley & Vaughan's, and a number of others; we got good results from them all at first. When Edison's aseptolin came out I also got good results from it. But at the end of three months all these preparations ceased to be effective. Very few are using the serums now except Von Ruck, Trudeau, and Denison.

A MEMBER.—Has Denison given them up?

DR. MCGAHAN.—The last time I saw him was at Washington, and he was not as enthusiastic as formerly. Dr. Baldwin said that at Saranac Lake they were using tuberculin simply for diagnostic purposes, and Dr. Denison did not say anything to the contrary as to the use he was making of it in Colorado, and I was given to understand that he likewise

has discarded it. My remarks in regard to drugs have been somewhat misunderstood. I use them all. They have all their place. But I place more reliance on food. Eggs and milk form my sheet anchor. If I can get my patients to take four eggs and two quarts of milk a day I am satisfied, and let them have whatever else they want. In conclusion, I would like to refer to another very important point that was brought up—that of knowing when our patients are cured. There is a general tendency on the part of the public to avoid a man who has been in a sanatorium. For this the medical profession is in large measure responsible, by giving countenance to the idea that tuberculosis is an incurable disease besides being very infectious. It seems to me that it is our duty to right this wrong as far as possible by doing something to indicate that a patient who has undergone a proper course of treatment and has been discharged as cured is no longer a source of danger to the community.

III. SCIENTIFIC AIDS TO DIAGNOSIS.

By HENRY D. HOLTON, A. M., M. D.
Brattleboro, Vt.

In discussing Scientific Aids to Diagnosis it is not so much with the intent of developing new aids as it is to call attention to and impress upon the general practitioner some of the aids upon which he may rely in perfecting his diagnosis in certain cases. In recent years many of the indications which the fathers considered pregnant with suggestions of causes or effect of particular diseases have fallen into neglect by reason of other more reliable and exact methods of determining the actual condition present. Especially are these aids of importance to the rural practitioner of medicine, who, unlike the urban practitioner of internal medicine, must rely very largely upon his own power of observation and deduction to determine just what the cause of the deviation from the normal state may be. The metropolitan medical man has subject to his call a score or more of trained specialists upon whom he can rely to interpret the danger signals nature

displays. The general practitioner, in his kingdom among the hills or on the broad prairie, is the "Light in the East," the only hope of thousands, and his correct interpretation of symptoms means relief from suffering and a renewal of life; his failure to appreciate and read aright these same symptoms results in days and nights of anguish, and not only possible but probable death.

Hence it is important that he be prepared to make use of all the reliable aids he can command, to the end that his ultimate conclusions may be correct.

It is not our purpose to discuss the importance of a careful examination by percussion and auscultation of both heart and lungs in every case in which there is the slightest suspicion that morbid changes are taking place in either of these organs, and we shall only allude to the importance of both a chemical and a microscopical examination of the urine, not only when the symptoms indicate an abnormal condition of the kidneys, but in all those cases when the symptoms are vague and consequently the diagnosis rather indefinite.

It is rather our intention to emphasize in the first instance an aid that has not found general favor with the profession, to wit, the use of the ophthalmoscope in the diagnosis of many affections of the brain and spinal cord, while it has been satisfactorily demonstrated that it is of much value in these cases. There seems to be an impression in the mind of the general practitioner that it belongs to the armamentarium of the ophthalmologist, and that it has nothing in it of value to him. Having made use of it for the last twenty years in many cases of real or suspected disease of the brain, I have been more and more persuaded of its value as an aid in diagnosis in such cases. It certainly ranks with the endoscope, laryngoscope, and sphygmograph in its value, but like them has failed to attract the mass of practitioners sufficiently to have them familiarize themselves with its use. The fact was first pointed out by Galezonski, and subsequently

confirmed by others, that the blood vessels supplying the disc were entirely independent of those supplying the retina, and especially that the supply to the disc was a part of the blood supply of the brain; it follows then that changes in the circulation of the disc are a part of similar changes in the circulation of the brain. The disc then is the dial on which we may read the changes taking place within the cranium. Here we may read of congestions, inflammations, hyperemias, as well as of anemic conditions existing in the encephalon. By the use of this instrument I have been able to make a diagnosis between permanent organic changes and functional disturbances. It is within the province of the general practitioner to make use of the ophthalmoscope, as it requires comparatively little use of it to be able to see everything within its scope and to become familiar with the normal appearances of the retina and luminous disc, and having once acquired this knowledge, any deviation from the normal is quickly recognized and its significance noted. Of the 118 cases observed in the last twenty years, forty-seven were either lost sight of or no satisfactory history was subsequently obtained; of the remaining seventy-one, autopsies were only made in twenty-nine; a brief outline of a few of these cases will serve to impress the value of the use of the ophthalmoscope.

CASE I.—M. G., aged 52. Was struck over right parietal bone with sufficient force to knock him down; he did not suffer any inconvenience for ten weeks, when he began to suffer from pain over right side of head and face supplied by fifth nerve; only temporary relief was obtained as the result of any treatment; the severity of pain increased, and at the expiration of six months he bought stronger lenses for his spectacles, as it troubled him to read with those he had been using; at the time an ophthalmoscopic examination was made, showing an anemic condition of retina; the disc seemed pale and somewhat contracted. From this time, while the progress of the case was rather slow, it was continually bad. First paralysis of right side of face and gradually of left arm. At the expiration of twelve months from the time of the

accident the patient was confined to his bed; the sight of the right eye was entirely lost, and that of the left much diminished, and at this time another examination of the fundus of right eye showed decided atrophy of the disc; the left was ischemic and contracted. Autopsy revealed a hard fibrous tumor about the size of an English walnut in middle lobe of cerebrum.

CASE II.—Mrs. C., aged 35. Mother of four children and now five months pregnant, complained of dimness of vision. Ophthalmoscopic examination of both eyes showed retinitis; disc was opaque, irregular, dotted with pearl-colored spots, the arteries were contracted, veins enlarged and somewhat tortuous. Examination of urine developed presence of albumen, hyalin, fatty casts, and granular matter. This case went on to full time with an easy labor without convulsions; the changes in the eye improved to some extent, but patient died at the end of nine months. Kidneys were contracted and granular. Heart normal.

CASE III.—Mr. M., aged 42. Mechanic, suffered from general neuralgic pains, weakness, insomnia, frequent nausea; vision hazy, and floated from one doctor to another without apparent benefit. From repeated examinations of urine it appeared very different at different times. Occasionally a trace of albumen and a few cylindrical casts; again normal in these respects, always diminished urea; gradually lost strength, and at the end of five months died. On autopsy left kidney contracted, granular, weighing two ounces; right, large, white, weighing five and one half ounces. On examination of eyes two months before death, retina dotted with white spots, especially around luminous spot; veins full; outlines of disc irregular.

These cases illustrate in a brief way the value of these examinations to the general practitioner. The first exhibits the changes arising from a morbid growth in the brain, and consequent interference in the circulation. The second emphasizes the changes which take place in the fundus of the eye in chronic albuminuria. Jackson, in a recent article, says that "noticeable changes are found in fifty per cent. of such cases; and distinct albuminuric retinitis occurs in not less than ten per cent." The third was an obscure case, and save for the examination of the eye would probably have failed to be correctly diagnosed.

Hematomantia,[1] or the diagnosis by examination of the blood, has been before the profession for so short a time that it has not become the accepted aid by the general practitioner that by its merits it is entitled to. It is true that the busy doctor has little time to perfect himself in the use of the microscope; he can, however, provide himself with a counting slide and hemometer, and call to his aid the State and municipal laboratories, and the increasing number of private ones; hence there is no reason why the most remote country doctor can not avail himself of these aids to accuracy in determining the cause or nature of the malady afflicting his patient. As yet it can not be said to establish a complete diagnosis in but a few diseases, but taken in connection with other carefully observed manifestations, it becomes an important factor in arriving at a correct diagnosis. Before considering in detail the pathological conditions found in different diseases, we must start with the examination of blood in its normal or healthy state.[2] The examination of blood in suspected typhoid or malarial fever are the two diseases in which it has become most frequent. Sufficient time has elapsed since Widal suggested his serum reaction as an aid to diagnosis in cases of suspected typhoid fever for other observers to verify his conclusions. Cabot has collected 5,978 cases in which various observers have applied the test; of this number 95 per cent. gave positive reactions. Of 1,478 cases which I have collected from various sources, which by clinical diagnoses were classed as genuine typhoid, Widal reaction occurred in a fraction over 94 per cent. It seems to be well established that instead of a dilution of 1 to 10, as at first practiced, it should be 1 to 20, and some have claimed 1 to 50. Serum agglutination appeared usually from the fifth to the fourteenth day, although in some cases it has been delayed until the third week. We should not base a diagnosis on one examination with a negative result. On drawing blood for examination in these cases, its coagulation

[1] For many of the facts connected with blood examinations I am indebted to Dr. Stone, of the Vermont State Laboratory.

[2] See tables at the close of this paper.

and fibrin seem normal. The red cells, 4,000,000–1,300,000, in the third week begin to decrease. White cells, no increase, in late weeks decrease. Hemoglobin loss relatively greater than loss of cells. White cells, increase in proportion of young leucocytes.

In suspected malaria the presence of the plasmodium malariæ in the blood is absolute proof of this disease. The red cells, ranging from 2,000,000 to 1,000,000, are reduced in number after each paroxysm, with a tendency toward regeneration during the afebrile interval. Hemoglobin diminished, with red cells which are deformed in size and shape, in a measure resembling their condition in pernicious anemia. In cases of suppuration in any part of the body, a blood examination will show a great increase in leucocytes. This diagnostic point is of great value in many cases of appendicitis in determining whether suppuration has or has not taken place. Laignet-Lavastine claims as an aid in distinguishing catarrhal from suppurative cases that the eosinophilic cells in the blood increase from the fourth to the eighth day to three or even six per cent., dropping back to one per cent. later.

In septicemia there is a diminution of red cells, 3,000,000 to 1,000,000; very little deformity; hemoglobin often exuding and staining the serum. Increase of white cells and fibrin, leucocytosis, and usually the infecting organism can be found. In anemia of which chlorosis is the type we find specific gravity low, a slight diminution of red cells and a greater diminution of hemoglobin. The cells are small and pale; many are deformed. White cells may not vary much from normal, but there will be an increase of lymphocytes. In pernicious anemia the blood is pale, coagulates slowly, red cells much diminished, 1,500,000 to 1,000,000, size increased, and deformed. While hemoglobin is decreased, it is still higher than the red cells; megaloblasts in great numbers, less number of normoblasts. White cells much diminished, 4,000 to 500; percentage of lymphocytes large, myelocytes small.

In lukemia we have two forms, the splenic myelogenous and lymphatic. In the first the red cells will be as low as 3,000,000; numerous nucleated forms, hemoglobin reduced two thirds. White cells only slightly reduced, but a large percentage of myelocytes. In the lymphatic form, while the red cells and hemoglobin remain about the same as in the splenic form, the nucleated forms are rare and the white cells are largely lymphocytes.

We shall only refer without going into detail to the aid derived from an examination by means of the X-rays in both medical and surgical cases and chemical and microscopical examination of the urine. By recourse to these various methods of examination we can arrive at a very accurate diagnosis in many cases heretofore shrouded in uncertainty, leading us to feel that we are most assuredly approaching the time when we may claim for medicine a place with the exact sciences. Surely the time has arrived when the physician, be he an urban or rural practitioner, must constantly make use of all these aids to an accurate diagnosis or be relegated to the domain of the inefficient and unworthy. Certainly no worthy surgeon can long maintain his own self-respect or the confidence of the people unless such of these aids are called into use as may be necessary to make his diagnosis accurate. In all cases demanding operative interference, except emergency cases, he should decline to operate until after the result of a blood examination has been made known.

In conclusion, we would impress upon the rural practitioners, who make up the great bulk of the profession, the great possibilities that these various aids present to them if they only choose to avail themselves of and perfect themselves in the use of these advances in scientific accuracy.

NORMAL BLOOD AND ITS VARIATIONS FROM THE NORMAL IN DISEASE.

NORMAL BLOOD—*Quantitative:* Red cells, 4,500,000–5,500,000; white cells, 6,000–10,000; blood plates, 200,000–300,000; hemoglobin, 100–90 degrees (Fleischl).

Qualitative: Red cells, uniform size and shape; no nucleated cells in adult blood. White cells (Young), large lymphocytes, 20–30 per cent.;

small lymphocytes, 4–8 per cent.; adult, (polymorphonuclear neutrophiles), 62–70 per cent.; old (eosinophiles), ½–4 per cent.; mast cells, ¼–½ per cent.

PRIMARY ANEMIAS — PERNICIOUS ANEMIA — CHLOROSIS: General—Blood as a whole very pale in marked cases, coagulates rapidly. Fibrin not increased. Specific gravity low.

Quantitative: Red cells, 4,000,000; white cells, normal; hemoglobin, 25 to 60 degrees.

Qualitative: Red cells, small sized, pale, often deformed, nucleated corpuscles rare; white cells, increased in lymphocytes; blood plates, increased.

PERNICIOUS ANEMIA: General—Blood excessively pale, watery, and fluid; coagulates slowly. Uneven, streaky appearance of drop.

Quantitative: Red cells, 1,500,000–1,000,000 or less; white cells, 4,200–500; hemoglobin, 60–20 degrees (usually high in proportion to number of cells).

Qualitative: Red cells, increase in average size; deformity of shape (poikilocytosis); staining changes; nucleated corpuscles present; megaloblasts (most numerous); normoblasts. White cells, large percentage of lymphocytes; small percentage of myelocytes.

LEUKEMIA: General—The drop as it emerges from puncture looks perfectly natural; very sluggish, coagulation slow.

Splenic Myelogenous Form—Quantitative: Red cells, about 3,000,000; white cells, about 450,000; hemoglobin, 30 degrees.

Qualitative: Red cells, nucleated forms numerous; white cells, 30 per cent. myelocytes.

Lymphatic Form—Quantitative: Red cells, 3,000,000 or lower; white cells, 100,000 or lower; hemoglobin, 30 degrees.

Qualitative: Red cells, nucleated forms rare; white cells, 90 per cent. lymphocytes.

TYPHOID FEVER: General—The blood appears normal on puncture. Coagulation and fibrin are normal.

Quantitative: Red cells, 4,000,000–1,300,000; in the third week begin to decrease. White cells, no increase, in late weeks decrease; hemoglobin, loss relatively greater than loss of cells.

Qualitative: White, increase in proportion of young leucocytes; serum, agglutin appears on average of from 5 to 8 days.

MALARIA: General—The presence of the plasmodium malariæ is absolute proof of this disease.

Quantitative: Red cells, 2,000,000–1,000,000, reduced in number after each paroxysm; a tendency toward regeneration and restitution during the afebrile periods. White cells, numbers subnormal, decreasing during paroxysms and rising toward normal again during afebrile period. Hemoglobin, diminished with red cells.

Qualitative: Red cells, deformity in size and shape; normoblasts, megaloblasts, and ghost cells (resembling pernicious anemia). White cells, lymphocytosis; increase in eosinophiles.

SEPTICEMIA: General—Blood in microscopic appearance normal. The infecting organism can usually be separated by cultural methods.

Quantitative: Red cells, 3,000,000–1,000,000, diminution depending on severity of disease; white cells, marked increase in a majority of cases; hemoglobin, running parallel with red cells, often exuding and staining serum.

Qualitative: Red cells, very little deformity; white cells, polymorphonuclear variety most in evidence.

DISCUSSION.

DR. T. D. CROTHERS, of Hartford, Conn.—I think we are under debt of gratitude to the author of this paper for showing the simplicity of the application of the ophthalmoscope as an aid in the diagnosis of diseases of the brain and cord. It shows us that we have in this instrument a new field of diagnosis within our reach, by means of which we may be able to arrive at far more accurate conclusions in regard to particular diseases and the stages of advancement which they have reached.

DR. ALBERT E. STERNE, of Indianapolis, Ind.—I rise merely for the purpose of calling attention to the fact that while the paper has not brought out anything new, anything that was not known to the members of the profession, it is gratifying to know that the means the essayist has spoken of for applying the ophthalmoscope may be so easily made use of by the mass of general practitioners. In regard to some of the other aids to diagnosis, they are not of the same advantage to the rural practitioner, because of the necessity of sending slides to cities, where they can be examined by those who have the proper appliances. I do not mean to say that these aids should not be made use of. I only wish to point out the difficulties that have to be encountered in making use of them. As to the ophthalmoscope, it has long been in use by neurologists, and I would be glad if I could substantiate the assertions of the essayist as to the absolute utility of the apparatus. I am afraid, however, that the changes in the disc are not to be construed as he interprets them. These changes, in other words, are not always indicative of the changes taking place within the brain. While the ophthalmoscope is undoubtedly of the greatest use as an aid to accurate diagnosis, a great deal of care and discrimination is necessary in interpreting the results it shows, and I think it desirable to warn general practitioners against falling into the mistake of supposing that it is so easy of interpretation. As a matter of fact, it is only safe to place definite value upon the condition of the fundus of the eye as revealed by the ophthalmoscope when distinct lesions of the optic disc are shown, such as papillitis—choked disc—in cases of gross lesion within the cranial cavity, or atrophy of the nerve in tabes, for instance, or such definite changes of the retina as retinitis albuminurica in kidney diseases. Anemia of the fundus oculi does not necessarily mean anemia of the brain.

DR. H. N. MOYER, Chicago, Ill.—Laboratory examinations of the different kinds set forth in the paper are not nearly so difficult as those who have not practiced them might think. This remark applies particularly to examinations of the blood. There is a rather widespread feeling among those who have not been educated in the modern laboratory that this is difficult. It is not. A man may master the ordinary technique himself in a very short time. The only difficulty is as to the interpretation of the changes which the apparatus shows. A more serious matter than the neglect of these aids to diagnosis is the neglect of ordinary methods of examination. Dr. Billings, in the address he delivered this morning on general medicine, said that fifty per cent. of the chronic cases that come to him have not been subjected to any examination. It is not the neglect of laboratory examination, therefore, but the neglect of the ordinary technique of the profession that is to be deplored. The eyes, the nose, the ears, and other organs ought all to be carefully examined. Yet, in regard to heart trouble, how often we hear a doctor say that a man has no heart disease because he heard no murmur, and yet it is well known that cases of incompetency occur of which no indication is given in this way. So also it is with stomach troubles, tabes, and other diseases. No general examination is made, and the consequence is that symptoms are overlooked which would enable a correct diagnosis to be made.

DR. G. W. MCCASKEY, Ft. Wayne, Ind.—I would like to say a word as to the ease with which examinations of the blood can be made. I make them in 90 per cent. of the cases that are brought to me. It is true I have a properly equipped laboratory and a competent assistant, but the fact I want to bring out is that I can determine the general characteristics of the blood by an examination that does not take more than fifteen minutes. In ordinary cases it is not necessary to make an exhaustive study of the details. The general facts are sufficient for the doctor's guidance. In obscure cases more careful examinations can be made, but I do not think any of such cases should be allowed to pass without a general blood examination.

DR. HOLTON (in closing).—My object in preparing the paper was to impress on the rural practitioner the ease with which these examinations can be made, and the extent to which they may assist him in arriving at accuracy in his diagnosis. These aids to diagnosis are not made use of to the extent that they might be by my urban brethren. Why they neglect them has always been a source of wonder to me.

As to the ophthalmoscope, it may be open to some of the objections that one of the speakers urged to it on account of the difficulty of interpreting the changes which it discloses in the disc; practice and observation will overcome this. In an experience of twenty years I have never found it to fail me or lead me astray in regard to essential facts. I want the rural practitioner to try it for himself, and feel confident he will not be disappointed. Rural practitioners make up the great mass of the profession, and they ought to avail themselves of all possible means that will aid them in making an accurate diagnosis.

IV. A DISCUSSION OF THE MORBID CONDITIONS OF THE UPPER RESPIRATORY TRACT RESULTING FROM THE INFECTIOUS DISEASES.

By CAROLUS M. COBB, M. D.,
Boston, Mass.

The intense interest with which the profession has studied and is now studying the etiology of diseased conditions and the interdependence of widely separated diseases has led to a discussion of the relation of disease in the upper respiratory tract, not only to neighboring organs, as the eyes, ears, and lungs, but to general diseases as well.

That local disease in the upper air tract may cause disease of the larynx, the bronchi, and the air cells either by extension of the disease process or by interference with the normal breathing, is, I think, admitted by a large part of the profession. It is equally true that the same local condition may cause systemic disease either by the migration of bacteria through the lymph or blood currents, or by the absorption of toxines resulting from the local disease. So far recorded cases show that infection from this source has a tendency to attack the surrounding glands, the joints, the peri- and endocardium, and more rarely the kidneys. It is quite probable that more extended observation may show that other organs are liable to infection in this way. Not only is

local disease in the upper air tract a source of infection in acute inflammatory conditions, but also in those slower forms of inflammation which are called subacute or chronic. It is perhaps a safe rule never to consider the examination of a chronic disease, which could originate in this way, as complete until we are certain that there is no point of infection in the upper air tract. The importance of diseases of the nose and throat in relation to ear disease is too well recognized to need any extended notice.

It is only necessary to call attention to the fact that fully 75 per cent. of the deafness of the world originates in some disease or deformity in the nose or naso-pharynx.

With this brief summary of the more important effects of these diseases, we will now consider the etiology of the chronic inflammatory diseases of the upper respiratory tract. We shall not include in this discussion either syphilis, tuberculosis, lupus, rhinoscleroma, psoriasis, or malignant new growths, but rather confine ourselves to the so-called catarrhal diseases. The word catarrhal is at present only used in a generic or symptomatic sense, and does not or should not be used to imply that there is any inherent tendency in the individual or family to inflammation of the mucous membranes. It is of course admitted that circulatory and dietetic conditions may, and often do, have an influence over the course and severity of the inflammatory condition in the upper air tract, but there is no evidence that they ever cause a true inflammation of the nasal mucous membrane. A few words in regard to the effect that absorption from the intestinal tract may have upon disease of the nose and throat. This condition has received various names at different times, and it is not material in relation to this subject under which of these names the condition may be recognized. It is of course granted that the toxemia resulting from a faulty digestive process may be so intense and so prolonged that every secreting surface in the body may participate in the effort of elimination. The effect of this upon the nasal

mucous membrane is to cause congestion and to increase the secretions. If the membrane and secretions of the nasal chambers are healthy, this result is not important, but if they are diseased, the effect is likely to be more serious, and from this cause a nasal empyema which has been latent for a long time may be started into an activity which may last for months. This combination of local disease and the irritation caused by toxemia has led to a great deal of confusion in regard to the etiology of chronic nasal and post-nasal discharge. In this connection it can not be too strongly emphasized that a nasal or post-nasal discharge caused by toxemia should not continue indefinitely after the toxemia is relieved or cured. The well-recognized clinical fact that elimination by the bowels or kidneys is of benefit to these cases is misleading, first, because it relieves but does not cure the chronic cases; secondly, because the toxemia which is relieved in this way is often the result of the local disease in the upper air tract, and lastly, because the same method of treatment is used almost daily for many conditions which do not originate in a faulty digestive process.

We will leave this vexed and ever-recurring question of the etiological importance of intestinal absorption with this statement, that intestinal toxemia may and often does cause a temporary nasal discharge, but that this should not continue after the source of the irritation is removed, and secondly, that the same cause may increase an already existing disease. There is no evidence that intestinal toxemia ever causes a chronic catarrhal disease of the upper air tract, while on the other hand the researches of MacIntyre, Hajek, Ruault, Kanthack, Lennox Brown, Miller, St. Clair, Thompson, Frankel and others have shown that the so-called catarrhal inflammations are the result of bacterial action; and they have further shown that the bactericidal action of the normal secretions of the nose and throat is so great that so long as these secretions are healthy the individual will be likely to escape the ordinary throat troubles. There is every rea-

son to believe that this explanation of the origin of catarrhal disease of the upper air tract is correct, and we have then, as etiological factors, either a mechanical obstruction which interferes to a greater or less degree with normal respiration through the nasal chambers, or a secretion vitiated by disease.

Nasal obstruction, and consequent mouth breathing, has received a large share of attention in the last few years, and it is only necessary to call attention to the fact that one of the most injurious results of this condition is the interference with the action of the nasal secretions. The air in normal breathing through the nasal chambers is warmed, moistened, and freed from bacteria. The secretions may remain healthy, but are unable to do their work on account of the mechanical obstruction. The second etiological factor is an unhealthy nasal secretion, either with nasal obstruction or with a normal breathing space. A point which needs emphasis is that the unhealthy secretion is not the result of the the nasal obstruction *per se*, but is rather the result of an acute inflammation of bacterial origin. An unhealthy nasal or post-nasal discharge does not differ etiologically from a chronic discharge in other parts of the body, *i. e.*, it is the result of an acute inflammation in a cavity the drainage of which is interfered with to such an extent that the membrane lining the cavity does not heal.

I attempted to show in a recent article[1] that the discharge which is known as nasal and post-nasal catarrh has its origin in the nasal accessory sinuses, and I wish now to call your attention to the important part which the infectious diseases play in this involvement of the sinuses. The diseases which may infect the accessory sinuses, as given by Hajek in the order of frequency, are acute coryza, la grippe, pneumonia, typhoid fever, facial erysipelas, scarlet fever, measles, diphtheria, smallpox, and cerebro-spinal meningitis. To these should be added the purulent rhinitis of children, which often begins at birth, perhaps from an infec-

[1] Archives of Otology, Nos. 2 and 3 of Vol. 29.

tion in the parturient canal. The infection of the sinuses which occurs during the course of these diseases can not with certainty be attributed to the primary disease in all cases. But the bacteriological evidence that the sinuses are infected by the primary disease in pneumonia (Frankel, Weichselbaum), influenza (Lindenthal, Weichselbaum), diphtheria (Weichselbaum, E. Frankel, Dmochowsky, Zuckerhandl, Wolff, and Richard Mills Pearce), is conclusive. It is a fact worthy of notice that even in these diseases secondary infection may occur, and Zuckerhandl calls attention to some cases of diphtheria in which the sinuses were intensely inflamed without the presence of true membrane, and he considers these as cases of secondary infection by other bacteria.

To Frankel belongs the credit of first calling attention to the involvement of the sinuses during the course of croupous pneumonia. Weichselbaum makes the astonishing statement that he found the accessory sinuses involved in 90 per cent. of those dead of epidemic influenza. Wolff has reported the results of a bacteriological examination of the sinuses from autopsies performed on twenty-two cases of diphtheria, five cases of measles, and two cases of scarlet fever. He found the antrum involved in all of the cases of diphtheria, and in many of the cases one or more of the other sinuses were also affected. The inflammation of the sinuses varied in intensity, fifteen of them being severe; in twelve of these the Klebs-Loeffler bacilli were found, the other seven were simply mild attacks caused by other bacteria. Of the five cases of measles examined, the antrum was found involved in three. Cultures from the antrum in two cases showed the streptococcus and pneumococcus, and in one the staphylococcus. The sphenoid sinuses were not involved. In one of the cases of scarlet fever, the antrum and sphenoid sinuses were involved, and cultures showed staphylococcus pyogenes aureus and the bacillus pyocyaneus. The other case showed no inflammatory changes and the cultures were sterile. Richard Mills Pearce, of the Boston City Hospital, reports

that he obtained cultures from autopsies of thirty-nine cases of diphtheria, two cases of diphtheria with measles, five cases of diphtheria with scarlet fever, and four cases of scarlet fever. In the thirty-nine cases of diphtheria, inflammatory changes were found in the accessory sinuses of twenty-five. The number of sinuses involved varied in the different cases, the antra being the most often affected, *i. e.*, in sixteen of the twenty-five cases. Both cases of diphtheria with measles had double antral disease, Klebs-Loeffler bacillus and streptococcus being found in both antra in each case. Of the five cases of diphtheria with scarlet fever only two had disease of the accessory sinuses; in one of these cases all of the sinuses were involved, and in the other the disease was unilateral. Cultures from one case showed Klebs-Loeffler bacillus and a variety of unrecognized bacteria; from the other streptococcus and staphylococcus. In three of the four cases of scarlet fever inflammatory changes were present in the accessory sinuses. Cultures showed streptococcus and staphylococcus albus and aureus, and the bacillus pyocyaneus, and in one a short diplo-bacillus. One important fact was noted by Dr. Pearce, which was that the "inflammatory changes in the antra did not produce symptoms sufficiently marked to attract attention during life."[1] A reason for this was probably the serious condition of the patients while under observation. If this large percentage of the fatal cases of these diseases suffer from involvement of the accessory sinuses, it is probable that many of the cases which recover are similarly affected, and this explains the persistence of the Klebs-Loeffler bacillus in the nose for weeks and even months after all other evidence of disease has disappeared. Positive cultures have been obtained from the nose after six to twelve weeks in different cases in the Boston City Hospital, and in one case in the Lynn Hospital for Contagious Diseases after fourteen weeks. Le Gendre and Pochon reported a case in which positive cultures were obtained from the nose for fifteen months after a case of nasal diphtheria. In this case douch-

[1] Reprint from the Journal of the Boston Society of Medical Sciences, March, 1899.

ing the nose would cause the bacilli to disappear for a time, but they would reappear as soon as the douching was stopped. Post-mortem examinations, such as those of Wolff and Pearce, are of the utmost practical importance, and it would be of benefit to the profession if more of them were made and reported.

We will now briefly consider some of the clinical manifestations resulting from these diseases. One of the most noticeable results of the infectious diseases upon the nose and throat is the hypertrophy of the glandular tissue. This hypertrophy may be confined to the faucial tonsils alone or all of the tissue of Waldeyer's ring may be involved, *i. e.*, the tonsillar tissue on the posterior wall and vault of the naso-pharynx, the cushions of tonsillar tissue around the Eustachian tubes, the faucial and lingual tonsils, and even the tonsillar tissue in the larynx. Often these throats look as though the muscular walls were thickened. This appearance is caused very largely by the interference with the action of the muscles by the masses of hypertrophied tonsillar tissue. The effect within the nasal chambers is equaly well marked, the whole glandular structure being apparently involved in some cases. Acute coryza, measles, scarlet fever, and diphtheria are the diseases which seem to be followed by the greatest amount of glandular hypertrophy. Associated with this increase in the size of the lymph glands there is usually a purulent rhinitis, which may be due in part to the interference with drainage by the hypertrophied glandular tissue in the nose or naso-pharynx and in part to local disease within the sinuses. It is safe to say that the longer this condition is allowed to continue the more likely it is to lead to a chronic catarrhal condition.

The clinical history of cases of nasal and post-nasal catarrh shows the etiological importance of the infectious diseases. When a patient fixes a definite time as the beginning of the discharge it is very easy to find the disease of which the catarrh is the sequel, but all patients are not observing, and

often the disease has existed for so long a time that it is hard to trace its relation to the original cause. It is easier to trace the effects of diphtheria and scarlet fever than it is that of other diseases, because the laity believe that these diseases leave the throat in a bad condition, and they therefore attach importance to any trouble which they may have with the throat after such attacks. An analysis of 243 chronic cases of disease of the nose and throat during my last service in the Lynn, Massachusetts, Hospital shows 112 cases of adenoids and enlarged tonsils, twenty-nine cases which had obstructive disease of the nose, and 102 cases with nasal or post-nasal discharge without nasal obstruction. Unfortunately the history of the adenoid cases was not kept, thus rendering it impossible to form a true estimate of the relative etiological importanct of the different infectious diseases. Of the twentv cases of nasal obstruction only seventeen complained of nasal or post-nasal discharge. Of the 102 cases which complained of nasal or post-nasal discharge without nasal obstruction, 31 had suffered from childhood, or did not know when it began, 25 followed one or more attacks of influenza, 14 followed an attack of diphtheria, 11 were caused by repeated colds, 7 followed scarlet fever, 6 followed measles, 4 followed typhoid fever, 2 followed pneumonia, 2 followed whooping cough.

It is quite probable that a large percentage of the cases which are given as existing from childhood belong with the cases given as caused by the acute infectious diseases and the remainder to the purulent rhinitis of children caused by various infections. In this list of unselected cases 69 per cent can be directly traced to the infectious diseases, and this is a very fair estimate of the cases in general. It is of course granted that different series of cases may give different percentages for the individual diseases, but the result will not be materially different. The importance of the so-called catarrhal inflammations of the upper respiratory tract and the relation which is shown to exist between these diseases and the infectious diseases demands the utmost care on the part of the

general practitioner, not alone in regard to the diagnosis of this complication of the infectious diseases, but for the treatment during convalescence, at which time so much can be accomplished. This complication is easily overlooked during the height of the primary disease. The failure to make a diagnosis of the involvement of the accessory sinuses leads to serious results, because the after-treatment is absolutely neglected.

Treatment during the height of the primary disease is generally useless and often dangerous. This danger consists in the use of sprays and douches, which are almost certain to carry the disease farther than it would have extended if let alone. One of the most serious consequences of this treatment by douches and sprays is the involvement of the middle ear, which almost invariably follows their use. It is therefore during convalescence that these patients should be watched and treated, and they should not be considered well so long as there is obstructed nasal respiration, or a purulent or mucous discharge from the nose or throat. It is often necessary to keep them under observation for weeks and even months, but if by doing this we succeed in preventing the establishment of a chronic catarrhal condition, with its attendant complications, we shall confer a lasting benefit upon our patients. As to the treatment of these cases, a large percentage of them can be cured by the persistent use of ointments or pigments containing at first antiseptics, and later absorbents and astringents. A few cases, however, may go on to extensive suppuration, which demands opening of the affected sinuses and thorough drainage. The results obtained from treatment will of course depend upon the extent and severity of the disease within the sinuses, but nowhere can more be accomplished by persistent effort than in these cases. The points which I wish to emphasize in closing are:

First, the importance of the so-called catarrhal inflammation of the upper air tract, not only in relation to local disease,

as catarrhal inflammation of the middle ears, the eyes, the larynx, and the bronchial mucous membrane, but to general systemic infection as well.

Second, that nasal obstruction does not cause a catarrhal discharge *per se*.

Third, the frequency with which the accessory sinuses are involved in the infectious diseases.

Fourth, the neglect of the diagnosis of this involvement of the sinuses, either during the course of the primary disease or during convalescence.

Fifth, the hypertrophy of the glandular tissue in the throat and nose following the infectious diseases.

Sixth, the persistence of the Klebs-Loeffler bacilli in the secretion of the nose, which may be a serious menace to the public.

Seventh, the large percentage of the cases of catarrhal disease, *i. e.*, where the complaint is of a nasal or post-nasal discharge, which can be traced to the infectious diseases. In the table given in the paper 69 per cent of these cases could be traced directly to some one of them.

DISCUSSION.

DR. L. H. WARNER, New York.—The paper to which we have just listened hardly calls for criticism, so thoroughly has it dealt with the subject of which it treats. There is only one point that I would like to emphasize, and that is that in studying the etiology of these affections of the air passages, it is generally found that they are traceable to disorders of the digestive organs, from which it follows that it is always well to study the condition of these organs when seeking to establish a diagnosis. In regard to treatment, I should like to suggest that the use of general antiseptics is out of order. We must bear in mind that acid antiseptics will destroy tissue and encourage further bacteriological invasion. Weak watery solutions of Tyree's antiseptic powder, an alkaline antiseptic, become of special value.

DR. WILLIAM F. BARCLAY, Pittsburgh.—The paper just read is one that ought to be very carefully read by every practitioner, more especially by every one who treats the diseases incident to childhood. We can not give too much

attention to the study of the subject. I am satisfied that great harm is done by many practitioners of medicine who overlook the treatment of the air passages in conditions following the exanthematous diseases. I do not know whether the author of the paper has paid particular attention to chicken-pox or smallpox, but I have seen more cases of nose and throat trouble follow these than probably any other diseases. Almost invariably, too, we have affections of the nose and throat follow diphtheria and scarlet fever. I hardly know what the author meant when he told us that we should overlook the immediate treatment of these diseases of the nose and throat. I doubt whether he is right in that statement—if I am correct in my understanding of what he meant to convey. I think proper treatment immediately applied is of very great importance, and that many of the cases that become chronic might be obviated if immediate treatment were given. Of course it is a question of how we should treat such cases, and almost every practitioner has his or her own special method. For myself I doubt the use of aqueous solutions, no matter in what form they are used. I am aware that the application of douches is a common practice with most practitioners, but I am inclined to believe that it is rather injurious. I believe that the mucous membrane of the nose and throat absorbs watery solutions, and that on that account it is doubtful if they are efficacious. I have been in the habit of using an oleaginous ointment consisting of aristol, menthol, and oil of pine needles. Every practitioner can make up his own preparation. I have tried various other combinations, but none of them has given such satisfactory results as the one mentioned. The paper dealt with the etiology of these troubles more than with the treatment, but to that branch I have nothing to add, for I think it was in all respects very satisfactorily handled by the author, and as I have already remarked, the paper will on that account be of the greatest advantage to the profession, and should be read by every practitioner.

DR. J. HOMER COULTER, Chicago.—I do not rise to add any word of criticism to the paper of Dr. Cobb, believing with those who have just spoken that it is almost above criticism in any way.

There are, however, one or two points concerning which I should like to say just a word in addition. One of these is with reference to the relative frequency of the infection of the different sinuses, and the probable comparative etiology of such infections. It is not only possible, but quite mechanically probable, that the antrum of Highmore is most frequently infected simply because of its position and because

of its more accessible opening, and the consequently much greater ease with which infection may be introduced into the cavity. Another point of some considerable consequence is with regard to the peculiar vulnerability exhibited in certain patients. Not only are some persons more apt than others to become victims of infectious disease itself, but certain ones, for some reason, are much more likely to suffer also from these morbid conditions of the respiratory tract to which Dr. Cobb refers. These I apprehend might be in large measure averted, or abridged, if the profession was generally more cognizant of the facts and the dangers so truthfully portrayed by the paper.

This, in turn, brings out to my mind one of the most important factors in the consideration, and that is the necessity for either a concomitant or subsequent constitutional treat ment, looking toward the avoidance of an upper respiratory pathology.

DR. EMIL AMBERG, Detroit, Mich.—The concise paper of Dr. Cobb invites the thought that sometimes digestive disturbances may follow suppuration in the ear. We are aware that, especially in children, pus often wanders through the Eustachian tube into the digestive tract. It is important in considering the indications for operation to take this fact into account, for it is surely better to let the pus escape to the outside instead of allowing it to get mixed with the food.

DR. JOHN NORTH, Toledo, Ohio.—I hardly feel able to discuss the paper without having read and studied it. It contained a great many good ideas, and so far as I could observe no bad ones. Altogether it seemed to me a most excellent paper, and one that will bear careful re-reading. On one point I would like to make a remark. I have long thought that the profession makes a mistake in considering catarrhal troubles as inflammatory. I believe they are due to a disturbance of the vaso-motor system, though undoubtedly some of those affections following infectious diseases are inflammatory. The fact is our ideas of inflammation generally have undergone such a change in recent years that it might be well if all our books on pathology were destroyed and a new one written more in harmony with modern teaching and thought. I believe that there are infectious conditions that produce these affections of the upper air passages, but at the same time we should not lose sight of the fact that a great deal of the trouble is frequently due to vaso-motor obstruction. If there is a nasal obstruction it interferes with the function of the nostrils, and the result is the production of a hyperemic condition and excessive secretion. This we call catarrh. When the obstruction is removed the excessive

secretion is relieved. That in brief is how many of these troubles are produced. I do not like the term "catarrh." I do not know what it means. It covers a great deal. It simply describes a condition, but there are a great many conditions to which it is applied, and therefore it is not a good word to use. So far as medication is concerned, I am not in favor of the douche, nor am I in favor of the use of strong alkaline solutions. I believe to a certain extent in the spray, but some attention must be given to general treatment. Parke, Davis & Co. make up for me a tablet of resorcin compounded with sodium borate and sodium bicarbonate. A five grain tablet dissolved in one ounce of water contains one per cent of resorcin. This I find is a most excellent thing for the mucous membrane. After having used the tablets, I apply an oleaginous combination, one or other of the petroleum preparations. I take care not to use too much pressure, for I believe that the nasal cavities should not be treated too vigorously. I fear that a great many of these little things are frequently overlooked in the treatment of affections of the upper air passages. Purulent rhinitis in particular requires careful attention. As a consequence of it a hyperplastic condition is frequently set up which results in atrophic catarrh.

DR. ALBERT E. STERNE, Indianapolis, Ind.—I think it would be a great pity to indulge in any criticism which would lessen the credit due to Dr. Cobb for the breadth of view he has shown by looking at nasal diseases in a general way and not as a specialist. The general practitioner frequently finds that the infection of the sinuses is merely part and parcel of a general condition, and that consequently it would be a grave mistake to treat the regional trouble as if it were merely of a local character. Every practitioner knows that in grip almost the sole distinguishing symptom is intense pain in the region of the sinuses, and this is the one feature which leads the patient later on into the hands of the nasal specialist. But this affection is secondary, not primary. The general affection is primary, the local affection secondary. It is high time that other specialists should broaden their views as Dr. Cobb has done. On the other hand, it is no doubt true that local symptoms may spread and bring about a general infection. It would be a great mistake to regard diphtheria as a local trouble—as great a mistake as it would be to so regard syphilis. Both these diseases have a local beginning, but they are systemic. It is the same with tonsillitis. It is a general condition arising from a local affection. As a general rule, however, the reverse is the case—that is, local conditions arise from a general infection.

DR. COBB (in closing).—I have to thank you for the reception given to my paper. I am aware that it is very weak in regard to treatment. That was really not the intention with which it was written, my principal object being to call attention to the connection between the two forms of infection, local and general. In regard to treatment, I would simply like to say that in the Hospital for Contagious Diseases, in Lynn, it has been found that most of the children suffering from affections of the upper air passages have some involvement of the middle ear. The custom in these cases is to spray the nose, and we find that good results are obtained from alkaline sprays. We used to wash out the secretions, but we found that when they were left alone they were not so likely to get middle-ear trouble. Now, as to the relative frequency of the causes of infection, it was not intended that there should be anything in the nature of finality in the observations I made. It is always a matter of more or less difficulty to get a correct history of these cases. Apparently, diphtheria is responsible for a great deal more than the other diseases, but it has been my experience that measles may occasionally produce a very severe and long-continued infection. You have no idea of the extent of the inflammation we find in some of these cases that we get in the hospital. Practically every cavity connected with the upper air tract is involved. In connection, however, with measles I would like to make the suggestion that the infection from this source is not so deep as that from diphtheria. It is more on the surface, and while severe, it is not so likely to produce caries as diphtheria, scarlet fever, and several other diseases, nor is it likely to be followed by such long-continued discharge. I have no statistics to prove my theories as to the relative frequency of the causes of infection. I have only offered the results of my observations in the hope that they would induce others to follow up the same line of inquiry. As to the remarks of Dr. North in regard to obstruction being the cause of inflammation, I am afraid he and I will have to continue to disagree. I say this because I have seen so many cases in which there has been nasal obstruction, and yet nothing at all in the nature of inflammation. One somewhat remarkable case bearing on this point was that of a patient who came to me recently. He was seventy-three years of age, and had begun to have catarrhal deafness following an attack of influenza. I found that he had not breathed through his nose for sixty-eight years, and yet there was no inflammatory trouble until he had influenza. This would seem to show that some other condition besides nasal obstruction is necessary to produce the affection.

V. ASTHMA.

By JOHN NORTH, A. M., M. D.,
Toledo, O.

Definition.—Asthma is a reflex neurosis, characterized by recurrent paroxysms of violent dyspnea.

Etiology and Pathology.—I know of no disease in which so many curious and absurd theories have been advanced to account for the cause and symptoms as that of asthma. Some writers treat of it as a disease, others as a symptom, and still others as a combination of conditions, without any positive pathological basis. I am surprised, in looking up the subject in some of our late text-books on practice, to find such confusion of ideas, with no clear conception of either the etiology or pathology of asthma. Most of them seem to be simply compilations of views and theories held a quarter of a century ago. No physician can intelligently treat a disease without understanding the underlying cause and pathology of it. We must remember that it is not simply the name of a disease that we are treating, but that we have an individual to treat in which we have temperaments, environments, and other conditions on the part of the patient to contend with in addition to the causes and conditions in the case under consideration.

The ancients believed asthma to be due to the contraction of the bronchial tubes. This was denied by Laennec. Copeland calls it nervous asthma, while Walshe suggests the term hemic asthma as a term best describing the condition in these cases. Pree contended that the attack was due to some specific irritation in the air tubes, and that the asthmatic paroxysm was an effort to expel the so-called irritating humors. Bean believed that all cases developed from a primary bronchitis. Todd regarded the disease as humoral, comparing it to gout or rheumatism. Budd divided asthma

into two varieties, one depending upon cardiac disease, emphysema, etc., the second form due to a spasm of the respiratory muscles. As late as 1874 we find Bennett, in his Principles and Practice of Medicine, considered asthma only as a symptom of emphysema and bronchitis. Bergson, in 1852, was the first to describe it as a separate and distinct disease. Bosworth calls asthma a vaso-motor bronchitis. Loomis, Trosseau, Salter, and others consider asthma a diathetic neurosis. Morton compares it with spasmodic croup, and says that the tendency to asthma comes at about the time that spasmodic croup has a tendency to cease. He believes that both diseases are due to disorders of innervation of the larynx in croup and of the bronchial tubes in asthma; the immediate cause of the paroxysm being excess of venous blood in the medulla. A great many modern writers regard asthma as a neurosis of the pulmonary plexus. Hay attributes it to the effect of uric acid in the circulation in the thorax. The uric acid theory of asthma is accepted by a large number of the profession, and it is rapidly gaining ground as a factor in producing the paroxysms. I am very strongly of the opinion that the oxalic acid dyscrasia has much to do as an exciting cause in connection with the uric acid diathesis.

Most of the theories that have been advanced contain some truth; it is only by taking the truth from each that we come to the correct conclusion in regard to the paroxysm of asthma. The following outline seems to me to be the most plausible. Three factors are required for the production of asthma, which I have designated as the "Asthmatic Tripod."

First—A vulnerable area of mucous membrane. Second—An abnormally sensitive nerve center. Third—An external irritant or exciting cause. If all these three factors are present at any one time we will have an attack of asthma; no two of them can produce an attack, but all three are required.

The various names given to the different varieties of asthma are derived from the locality of the vulnerable area of mucous membrane. In nasal, pharyngeal, or naso-pharyngeal asthma we have the sensitive area in the nose, pharynx, or naso-pharynx. Rhinologists are apt to overlook all other causes and treat the nose and pharynx alone. Polypus, or hypertrophic catarrh, deviation of septum, nasal spurs, tumors, adenoids, and other conditions of the upper respiratory tract causing obstruction to free nasal respiration are frequently found in asthma. A. Schiff, in his experiments on animals, found that excitation of the superior laryngeal, or of the first and second branches of the trigeminus nerve, augmented the blood pressure in the left auricle, with dyspnea. This corroborates the connection which has long been noticed between asthma and affections of the nose. If bronchitis exists, it is called bronchial asthma. If the vulnerable area is in the stomach it receives the name of peptic asthma. Cardiac asthma is also described, but it properly comes under the head of bronchial asthma, owing to the bronchitis due to the heart lesion. The irritant applied to either of these locations, providing they be hyperesthetic from chronic inflammation and the abnormally sensitive nerve center also exists, is reflected along the pneumogastric nerve, giving rise to the paroxysms of asthma. The paroxysms of dyspnea are due sometimes to spasm of the muscular coats of the bronchial tubes, sometimes to tumefaction of their mucous membrane from capillary vaso-motor disturbance, and sometimes both these conditions are present.

The second factor in the production of asthma, an abnormally sensitive nerve center, is of great importance. It may either be inherited or acquired. It is a very common thing to hear of asthma being spoken of as an hereditary disease. It is the transmission of a sensitive or deficient nerve center from parent to child, and if the other two factors exist, then the individual has asthma or some other reflex neurosis. All observers have noted the neurotic element in asthma.

Those who inherit this neurotic condition require more care and consideration than when it is acquired. When the abnormally sensitive nerve centers are acquired, removal of the cause will relieve the disease. The cause of the acquired neurosis has received considerable attention. It is usually caused by the presence of some irritating substance circulating in the blood, and in passing through or in close contact to the nerve centers overcomes their irritability and in time these centers become sensitive, and a very small irritation to the vulnerable area of mucous membrane causes the paroxysm of asthma to manifest itself.

An excess of any of the nitrogenous or waste products of the body may, if not eliminated, produce irritation and excessively sensitive nerve centers, the most common of these being uric acid and oxalic acid or oxalates. These are both produced by defective metabolism or by their retention in the blood. Uric acid in the blood so alters nutrition as to cause a neurosis of the branches of the pulmonary plexus, thus inducing hyperesthesia and engorgement of the mucous membrane, thus irritating the vaso-motor system, and spasm of the muscular coats of the bronchial tubes take place. Asthma has frequently been observed to alternate with those diseases that are generally attributed to the uric acid diathesis, as neuralgia, gout, rheumatism, angina, migraine, etc. Clearing the blood of uric acid (by precipitation of the uric acid) has relieved asthma, only to be followed by gout or rheumatism. Asthma may be said to belong to the class of uric acid diseases due to the effect of high arterial tension in contradistinction to those produced by precipitation of uric acid into the tissues. Dr. Hay says in speaking of asthma: "Here again we have a possibly functional disorder, which, like so many I have mentioned, has long borne a somewhat indefinite relation to gout, and it has occurred to me, since my investigation on uric acid has brought to my notice its action on the arterials, that directly or indirectly it may affect the circulation in the bronchi and lungs, and so pro-

duce asthma. There are also not a few points in the history and symptoms of asthma and the onset of the attacks which may be taken as pointing to its possible origin in a uric acid storm."

I am satisfied that the oxalic acid dyscrasia is also a factor in producing abnormally sensitive nerve centers. This part of the subject has not received the attention that it should receive.

The third factor in the production of asthma, the external irritant or exciting cause, is more difficult than the other two factors, because we have so many exciting causes. It may attack both sexes at all ages, but men are afflicted by it twice as often as women, being more exposed to the causes.

In nasal and naso-pharyngeal asthma any irritant that comes in contact with the upper respiratory tract may cause a paroxysm to manifest itself. In the bronchial form, fogs, cold with dampness, and changeable weather often give rise to an attack. In peptic asthma certain kinds of food may act as an irritant. A change of house in the same town, or even the change of rooms in the same house, will often bring on an attack. Uric acid or oxalates in the blood might act as the exciting cause, in addition to producing sensitive nerve centers.

The symptoms and diagnosis of asthma are so well known to the profession that I will not take up your time in going over them. That which concerns the physician is the treatment.

Treatment.—In the treatment of asthma we must take into consideration the three factors that are necessary to produce a paroxysm of dyspnea. As I have said before, it requires all three of these factors before we can have asthma. If one is removed the paroxysm will not occur even if the remaining two factors exist in their most aggravating form.

The treatment is divided into that of relieving the paroxysm of dyspnea and the treatment during the interval

to prevent its recurrence. We have no disease in which so many patent nostrums are advertised as in the treatment of asthma. If we see the patient during the paroxysm of dyspnea, we can not stop to analyze the case and determine what factor is the most prominent nor which one of them to control. What the patient wants is immediate relief. In recent cases, before organic changes due to inflammatory exudate have taken place, sodium nitrate in three to four grain doses seldom fails to relieve the patient in a few minutes, This can be repeated in half an hour until two or three doses have been taken. Freshly prepared nitrite of amyl, three to five drops inhaled from a handkerchief, relieves some cases at once. No good results are obtained from nitrite of amyl that has been exposed to the light and undergone chemical change. Nitro-glycerine is also an excellent remedy to relieve the dyspnea. All the nitrites relieve by overcoming the high arterial tension that always exists during the paroxysm. Morphia and atropia combined, used hypodermatically, give prompt relief. There is danger of creating the morphine habit by its use, hence care should be taken in administering it. Heroin in 1-12 grain doses affords relief. I have had excellent results with apomorphia in a number of cases. When the vulnerable area is situated in the nose or pharynx, the local application of cocaine will give prompt relief, but it is a remedy to be condemned, and should never be given to the patient to use. Nirvanin and chlorotone are much safer remedies. A solution of chloride of adrenalin applied to the nasal mucous membrane will relieve the vascular dilatation of this region, and give temporary relief. The administration of grindelia robusta is very highly praised by some. Others have failed to get any result from it. Inhaling the smoke of stramonium leaves, nitrate of potassium and other substances are well known to all of you. A score of other remedies might be mentioned. During the paroxysm I limit my remedies to the nitrites and opium preparations. We notice that the remedies that have been

recommended to relieve the paroxysms all do so by holding in control one or more of the factors in the asthmatic tripod.

Having relieved the paroxysm of dyspnea, the next thing is to prevent their return. The three factors necessary to produce asthma, (1) a vulnerable area of mucous membrane, (2) an abnormally sensitive nerve center, (3) an external irritant, are all present, and as it requires all three to produce an attack, we may apply our treatment to the removal of one of these or to any two or to all three. The nose and naso-pharynx should be carefully examined and if any disease is found in them they should receive proper treatment. Dr. Bosworth believes that all cases of asthma depend upon nasal disease. I have found many cases cured by nasal treatment, many relieved, and some not cured; but I also find that asthma is more readily cured after attention to the nasal disease. In some cases we are not able to reach and relieve all parts of the vulnerable area of nasal mucous membrane. In bronchial asthma, where there is tumefaction of the bronchial mucous membrane, iodide of potassium gives good results. In peptic asthma attention should be given to the stomach; care should always be taken in regard to diet. In all forms of the disease the external irritant or exciting causes should be ascertained if possible and effort made to avoid them.

To relieve the abnormally sensitive nerve centers, attention should be given to the nervous system, and the neurotic tendency overcome if possible. Nerve tonics and stimulants should be resorted to.

One of the most important things in connection with the preventive treatment of asthma is to combat the uric acid diathesis and the oxalic acid dyscrasia. I first stop all red meats, wines, malt liquors, tea, coffee, and place them upon milk, fruit, and carbohydrate diet—white meats. Phosphate of sodium is administered in sufficient doses to keep up free movement of the bowels and produce an alkaline urine. Phosphate of sodium is one of the best remedies we have in

the treatment of the uric acid diathesis. Then alkaline substances are given to remove the uric acid. Lithia salts are all very reliable. Alkalithia is a favorite form with me. It has given relief in more cases of asthma than any one remedy I ever used. After the uric acid is all eliminated from the blood, then treatment should be instituted to prevent its formation. To assist in the proper digestion, assimilation, oxidation, and destructive metamorphosis of the body, to overcome defective metabolism, I have never found anything equal to nitric and hydrochloric acid (not nitro-hydrochloric acid). My usual method of administering them is to take

℞ Nitric acid, ... ʒi;
Hydrochloric acid, ... ʒij;
Liquor pepsin, ... ℥iij.
Mix and dispense in colored bottle.

Mix each acid with the pepsin separately—do not mix the acids together before adding the pepsin, or undesirable chemical changes will take place. One teaspoonful of this mixture can be given in a glass of water at meal time.

In the treatment of asthma we must not lose sight that it is a reflex neuroses and that genito-urinary, rectal, and other diseases in addition to those mentioned may exist as a factor in its production. By a careful study of each individual case we may be able to cure a large proportion of cases of asthma, and give relief to all cases.

DISCUSSION.

Dr. L. H. Warner, New York.—I listened with great pleasure to the paper, but there is one point to which I must take exception, and that is what was said in reference to inheritance of disease. This is contrary not only to my belief, but I venture to say to the belief of every man who has made a study of physiology. Modern teaching is absolutely against the idea that disease can be inherited. There may be a condition prevailing in the parents that will so affect the child in utero as to render it liable to be affected by asthma or other diseases, but the diseases themselves are not inherited.

DR. NORTH (interrupting).—The speaker has entirely misunderstood me. I expressly said that the disease was not inherited, but that certain conditions predisposing to it might be inherited.

DR. WARNER.—I am sorry if I have unintentionally misquoted the author. Regarding the relieving of the mucous membrane, I should like to say before arriving at any action look more into the field of physiological chemistry, which has not been given anything like sufficient attention. The most important thing in connection with the class of cases under consideration is to ascertain what becomes of the nitrates which the essayist advocates in his treatment. We may only derive an amelioration of the conditions from the treatment suggested, especially if the disease points to uric acid as the etiological factor. Uric acid will combine in certain conditions with the nitrates. Certain parts of the acid will be eliminated while others will remain to form new combinations. There is always the danger that we may produce urate of sodium, and if that is observed microscopically you will find that the administration of nitrates will cause excessive phosphates in the urine, and that means destruction of the tissues. As to the diet, that indicated by the essayist is quite correct according to the teaching of physiological chemistry; the only point I wanted to make is that by giving nitrates we get from uric acid to urate of sodium, and this is apt to be productive of harm. For the proper study of these cases it is necessary to have an understanding of the blood as well as of the urine. The urine is only of secondary importance. The blood is the main thing. You will have to study the blood and corroborate the results by an examination of the urine.

DR. J. HOLINGER, Chicago, Ill.—From the essay one can not help getting the impression that the author has had a large experience in treating asthma, but on the other hand, from the great number of medications that he gives, the inference to be drawn is that he has had as little success as other practitioners in dealing with the disease. The question of course is a difficult one, and so many different opinions prevail both as to its etiology and treatment that it is not easy to say which is right. The last speaker has dwelt on the importance of studying physiological chemistry, but I am inclined to think that observation of the sick-bed and the teachings of pathology will give us just as much explanation as anything else. The author insists strongly on his tripod of factors for the production of asthma, a vulnerable area of mucous membrane, an abnormally sensitive nerve center,

and an external irritant or exciting cause. The tripod becomes unsafe, however, if one of the legs is removed, and there are many cases in which it is not easy to find all three causes.

DR. J. W. HUNTER, Waco, Texas.—I can endorse every word of the paper, especially in regard to the treatment. I have had considerable experience with cases of asthma, and have recently read two papers on the subject before our local societies, both of which were published and freely discussed by my home friends. In regard to the etiology of the disease, you have only to look to our authorities to find that a hundred and one theories are presented to account for it. The uric acid theory is the one I have specially studied, and my papers had mainly reference to that phase of the subject. Whenever you find a case due to excess of uric acid, that is, whenever you get a rheumatic history or a uric acid history, you can put your patient with confidence on alkaline treatment. It is as certain in its results and as clearly indicated as giving quinine for malarial fever. The patient should always be told at the same time to stop drinking and diet himself.

DR. JOHN M. BATTEN, Downingstown, Pa.—I believe that predisposition to asthma is more frequent than is generally supposed. I have known cases in which it passed through three generations. Age has also something to do with it, and so has climate, though it is not always easy to say what. I have known asthmatic patients leave Pittsburg and reside elsewhere with the result that they got rid of the ailment, and yet I have known other cases of an almost opposite character. I believe that anemia—the want of red blood corpuscles—is the producing cause of the disease. I think that if you give your patient tonics and increase the red blood corpuscles he will have no more asthma. The heart again is often a contributory cause of the disease, and if you treat the patient for his heart ailment the asthma will disappear.

DR. PORTON BENNETT, Daytona, Fla.—I cure all my cases of asthma, and I do it by using iodide of potassium and tincture of belladonna. I increase the iodide to thirty grains a day, and the tincture to about seven minims. By this means I can cure even cases of twenty years' standing without a change of climate. The cases I speak of are typical cases of asthma, and I feel confident I can cure them on one condition, and that is that they come to me before the hay fever season sets in.

DR. H. J. STEWART, Chicago, Ill.—The gentleman who preceded me made a very broad statement, which I feel I

have a right to challenge, ~~when he says he has and can cure~~ every case of asthma sent to him by the use of potassium iodide internally alone. I don't believe that potassium iodide in any size dose will cure every case of asthma; to prove my assertion will say that I have in mind a patient who had been treated by a number of physicians for over twenty years and had taken, I dare say, pounds of potassium iodide in every conceivable way without being cured, but after the removal of a nasal polypus the asthma disappeared as if by magic; another patient had suffered for twelve years and passed through the hands of a number of physicians and taken iodide of potassium until the name itself was repulsive to her, without any relief. She moved to a different climate and the asthmatic attacks ceased and she has not had an attack for over three years. Several other such cases, if time permitted, I might enumerate. The gentleman from Texas is almost as positive in his statements about the alkaline treatment; will say that I have used this treatment in a few cases with success, and in others it has proved absolutely useless. I have also used heroin, morphine, and several other remedies that I have heard recommended here to-day, but I must confess that not one of them has proved a specific or anything like it in my hands, and I don't think any one should make such positive statements about any one drug or line of treatment being a cure for a disease that may come from a variety of causes unless they can prove their assertions by practical demonstrations and not theory, and I am sorry to learn that another year has passed without some new line of treatment, which would be most welcome and of so much value to the general practitioner—treatment and cure of asthma.

Dr. Enoch H. Miller, Liberty, Mo.—In speaking about asthma I am speaking about something I ought to know something about, for I have had a great deal of personal experience with the disease. When we speak about remedies for asthma we generally refer to those that relieve the symptoms, but have little or no effect on the disease itself. Let us see the dilemma we are brought into if we follow the advice of the gentleman from Florida, and rely solely on iodide of potassium and tincture of belladonna. We may have asthma from a variety of causes, including affections of the heart, emphysema, or reflex from pelvic disease, and yet he gives them all iodide of potassium and tincture of belladonna indiscriminately. Now, in all these cases you must eliminate the cause of the disease, and surely it will not be said that iodide of potassium will cure emphysema of the lungs or

cardiac trouble or pelvic disease. Alkalithia will cure certain kinds of asthma, and I can see how it can be applied with success in cases where there is a rheumatic diathesis. I have again had cases I could not cure at home, and which got well when I sent them to Colorado, showing that there is some condition of the blood or nervous system, the nature of which I do not pretend to know, on which change of climate has an effect. There is also a neurotic element that I can not account for. I have known patients nearly dead with asthma to be instantly relieved by some excitement or when the attention was wholly attracted to some interesting scene, thereby showing a neurotic element in this disease. For many of these phases of asthma I am in the dark as to a remedy. Yet of all the remedies I am in the habit of using I must acknowledge that iodide of potassium stands highest. In my opinion it has proved more efficacious than all the rest put together. While making this statement, I wish it to be understood that I always endeavor to trace back each case to its individual cause, with the view of treating that. If it is true asthma, of which no particular cause can be discovered, I use the iodide of potassium in preference to any other known remedy.

DR. NORTH (in closing the discussion).—I do not think there is much that I am called on to answer, but there were a few things brought out in the discussion about which I may be allowed to say a word. I was very emphatic in my paper in saying that while some considered the disease could be inherited I did not, but that a predisposition might be transmitted. Of course, it is well understood that we do not inherit any disease. As far as the administration of nitrites is concerned, I do not claim that they effect a cure. They simply relieve the high arterial tension; in that way they relieve the paroxysms and pave the way for the treatment of the disease. One of the speakers has said a great deal about physiological chemistry. I have been teaching that branch of medical science for twenty years, and for fifteen years I have been devoting special attention to its bearing on such cases as those under consideration, and I do not think there is any danger of such a quantity of urate of sodium being formed as to cause any alarm. A vastly larger quantity of urate of sodium is being eliminated every day. The gentleman who dealt with this phase of the subject should remember that there is a great deal of difference between a patient and the laboratory. The test tube and the stomach are two very different things. In practice we are confronted by disease with a variety of symptoms, and our first duty is

to give the patient relief by attending to the symptoms. As far as treatment is concerned, the use of iodide of potassium is very good. There is nothing that will eliminate the uric acid better. I do not say every case of asthma is due to uric acid, but when it is iodide of potassium is a good thing to use. I do not recommend the use of many remedies, but simply attempted to give a rough outline of the number that had been used. I said that in relieving the paroxysms I limited myself to the nitrites, morphine, and similar drugs. Then I apply myself to constitutional treatment. If it appears that the nervous system is out of order, I give something to tone that up. If there is something causing irritation, I give something to eliminate it. The one thing that must be recognized is that you can not cure a patient without removing the cause of the disease as well as relieving the symptoms. There are, however, many things still to be learned in regard not only to treatment but also as to the etiology of the disease. This applies particularly to the part played in the disease by the nervous system. I have known a patient who could not go into a room and see a cat without being seized with an attack, and you are all familiar with other causes almost equally strange.

VI. HAY FEVER.

By A. D. MURPHEY, M. D.
Cincinnati, O.

Not unlike spasmodic asthma, hay fever is the result of a coincidence of three conditions.

1. Depleted nerve centers that are abnormally susceptible to the influence of uric acid.

2. Hyperesthesia of the peripheral termini of the sensitive nerves supplying the nasal mucous membrane.

3. The presence of one or more of a great number of atmospherical irritants, and climatic conditions.

These three conditions seem to be necessary for the production of an attack of hay fever, but not in my opinion for its continuance. In many cases after the disease has been in a measure thoroughly established, or in those influenced

by heredity, it may exist during the entire year, disregarding climate or floating irritants, the anemic nerve organs, central and peripheral, influenced by the presence of an excess of uric acid, seeming to be sufficient for the perpetuation of the nasal manifestion.

The same abnormal proportion of uric acid to urea in individuals influenced by heredity in other directions might produce migraine, angina pectoris, gout, or asthma.

Of symptomatology, diagnosis, and prognosis we are sufficiently familiar. Since opinions differ so little scientifically on the cause of the malady, the time has certainly come to settle upon some definite ideas concerning its treatment.

From the time when the disease was first recognized to the present, the list of remedies that have been suggested for its relief would make a fair-sized materia medica. Some that might be mentioned are the chlorides, by Elliston; Cazenave, the bichloride of mercury in solution; Helmhotz was certain great relief could be had by the use of quinine internally in large doses, and locally it was thought to be the thing by Sir Andrew Clark; Binz relied on salicylic acid, but cocaine has been looked upon as the comet of great omen by such prominent men as Burnett and Mackenzie, but has failed entirely in the hands of Robinson, who advises penciling the parts with carbolic acid and glycerine, one part to three. Antipyrine has been used successfully by Hinkle, applied locally, and given internally by Cheatham and Brooks; and so one might continue almost indefinitely.

The treatment of hay fever should consist of three important efforts:

1. The elimination of uric acid and the restoration of anemic nerves.

2. The correction of nasal abnormalities.

3. Relieving the suffering of the exacerbation.

The first two are comparatively easy, the last exceedingly difficult.

Prophylactic treatment should begin from six weeks to two months prior to the attack.

An effort should be made to establish the normal equilibrium of uric acid to urea; one part to thirty-three. This can best be done by the early administration of sodium salicylate, or lithia, well diluted, taken while there is an absence of food in the stomach; hot baths and exercise in abundance will assist materially in eliminating uric acid. While directing attention to this offensive product it will be well to notice the diet and see that the patient is not by his eating habits supplying himself as rapidly with uric acid as we are successful in getting rid of it. It is scarcely necessary to say that all acid-producing foods, as meats, acid vegetables, and wines should be omitted.

For the restoration of the depleted nerve centers I have found of great service a pill of phosphide of zinc, gr. 1/8, strychnia, gr. 1-40, and arsenious acid, gr. 1-16, given during the same period that the eliminating process is under way.

But the remedy in my hands that has given the greatest satisfaction not only in this but in other anemic conditions is a compound of a solution of bromide of arsenic, gr. 1-16, with the tri-bromide of gold, gr. 1-32. This solution can be prepared so a ten-drop dose will represent a 1-16 and a 1-32 of a grain respectively, given after meals, and is recommended for any stage of the disease.

In many cases of hay fever will be found decidedly abnormal conditions in the nasal cavities; polypi, spurs, and deflections of the septum, narrow nostrils, hypertrophy of the mucous membrane, which in my opinion are frequently coincidences.

Some of the most distressing cases of hay fever coming to my notice have been in people whose noses were almost perfect during the interval.

It is certainly understood without any suggestions from me that all abnormal growths and positions should be corrected by proper surgical procedures, and in the cases whose

only abnormal condition is a hypersensitive membrane, is the partial destruction of nerve and organs in the accessible portions of the sensitive membrane covering the inferior and middle turbinate bodies.

The ordinary method of linear incisions with the galvano-cautery knife, with the proper antiseptic after-treatment, is sufficient.

As a topical application for the relief of turgescence, and to promote the healing process during and after surgical efforts on the mucous membrane, I have never found anything so quick in its action and permanent in its effect as the extract of the suprarenal gland. For some years I have been intuitively opposed to the use of animal extracts. My first trials with thyroid extract, as well as the suprarenal, gave no noticeable results, but perseverence in their use has been gratifying. The preparation giving the best results in my hands has been a ten per cent powder of the extract in stearate of zinc or talcum. This is a convenient preparation, that can be entrusted to the patient without fear of danger of any kind. Several patients of former years who came during their attacks have returned and been under treatment the past two or three months and have had not even a suggestion of the disease.

Let us consider now the very serious question of undertaking the unsuccessful management of an attack of hay fever. It is my candid opinion we would be doing our patrons a favor and ourselves a credit by sending them away with the attack that is on, with the understanding they are to go under treatment upon their return, both surgical and constitutional, and submit again as early as July first of the following year. I recommend this as the wiser plan, but few of us are willing to miss the opportunity of testing our skill again and again in the management of the obstreperous disease.

A few times, in moments of desperation, I have cauterized extensively, with the galvano-cautery, the inferior turbinate bodies, which on some cases was successful, but sometimes

resulted in ulceration, lasting three or four weeks—thinking a great mistake had been made. This occurred in a few cases as long ago as five years, and I am gratified to know the disease has not returned.

While this method has been a success in a few of my cases, and possibly in many others, I deem it unwise, and to say the least a decided discomfort to our patrons to attempt such heroic measures while the entire nervous mechanism is in such an explosive condition.

The better plan is to support the exhausted nerve force with strychnine, arsenic, and phosphorus, subdue the tremor with bromides, and control the flood with a pill of camphor, gr. ¼, opium, gr. 1-16, atropine, gr. 1-20, and caffeine, gr. ⅛.

The acid treatment as suggested by Bishop has been gratifying to me and my patients. Some of you may question the propriety of administering acids to a patient who is credited with being too strongly acid in the start, but since uric acid is dissolved and carried away from the tissues in proportion to the alkalinity of the blood, rendering the blood less alkaline will tend to fasten the uric acid in the tissues in which it is stored, relying on hot baths and exercise for its elimination through the skin, leaving the rest to be gotten rid of after the attack.

Hence it has been found that large draughts of lemonade or Horsford's acid phosphate taken at bedtime and before rising in the morning will give gratifying results.

An internal remedy that promises much is the tabloids of suprarenal extract, five grains each, given every third or fourth hour. Trials with this have been few. Of its benefit locally in powdered form I can speak more confidently. Blowing it well up into the nasal cavities, it relieves turgescence by contracting the superficial vessels, the effect lasting for several hours.

The new alkaloid adrenalin, in normal salt solution, diluted to five or ten per cent., will relieve turgescence too, but the effect is much less permanent than the powdered extract.

Some relief from the local febrile condition can be derived from the use of ice to the face, forehead, and back of the neck, especially if associated with submerging the body in a tub of hot water; the heat dilates the blood vessels of the skin, produces perspiration, and induces sleep.

To Recapitulate.—Hay fever is a neurosis. It is the result of a coincidence.

1. A depleted nerve center.
2. The uric acid diathesis.
3. A vulnerable nasal membrane.

Its cure is best accomplished in the interval.

1. By ridding the system of uric acid by lithia and salicylate of sodium.
2. By restoring the nerve force with arsenic and gold bromide, or arsenic, strychnine, and phosphorus.
3. By surgery to the nose and topical application of powdered suprarenal extract.

DISCUSSION.

DR. JOHN NORTH, Toledo, Ohio.—I have not much to say in the way of discussion, because I agree with practically everything the author has said. Some one has said that hay fever and asthma are half-sisters, but it has always seemed to me that it would be more correct to regard them as twin sisters. We know a little as to the causes of each, but not much. Both depend more or less on the same conditions, but the question arises why do we not have hay fever the entire year round? Is it because in the fall of the year plants act as irritants and that in other seasons they do not do so? Then again we have changes at this season of the year due to conditions of the atmosphere. We have daily and annual variations of barometric pressure and atmospheric conditions, and there may be some changes peculiar to the fall which cause these peculiar symptoms. It is noteworthy at all events that along in July and August and September there is experienced the lowest barometric pressure of the year. We know that with low barometric pressure we have an increase of the nitrogenous products in the body and the amount of uric acid eliminated is much greater. Electrical conditions have also something to do with these things. These are some of the probable reasons why we have hay

fever more frequently at this season than at others. On the other hand, we know that altitude has something to do with the disease also, because in countries where the barometric pressure is high patients generally are relieved of all these troubles. As to treatment, I have used acids, by means of which we can cut short an attack. We can precipitate the uric acid and limit the duration of the disease for the time being. But sometimes we have to treat the symptoms rather than their underlying cause. Each case has to be dealt with separately according to circumstances. In some cases you may give a patient big doses of alkalies and yet find the symptoms increase in severity. Alkaline treatment should always be given either after or before an attack, never during an attack.

DR. C. M. COBB, Boston, Mass.—I feel that the question of physiology and pathology in regard to hay fever and asthma is still in a good deal of doubt. It is with me, at all events. One very common assumption is the relation that uric acid bears to the disease. That seems to me to require a good deal more confirmation by means of physiological chemistry and otherwise. I understand that Haig himself, the high-priest of uric acid, never succeeded in finding uric acid in the blood, but only quotes those who did find it. His observations are, as I understand, entirely founded on uric acid found in the urine. If all these patients have uric acid the thing must be very general. Hay fever attacks all sorts and conditions of men and women; it attacks those accustomed to all kinds of diet and all kinds of methods of life and conditions of affairs. If the production of uric acid were the sole cause of the trouble it would surely follow that it would be prevalent in some classes to a greater extent than in others. A certain number of cases in my opinion are due not so much to what is called auto-intoxication as to absorption of incomplete digestion. The word auto-intoxication is one that is apt to be too freely and loosely used.

DR. G. W. MCCASKEY, Fort Wayne, Ind.—My particular qualification for taking part in this discussion is that I have had a total lack of practical experience in dealing with hay fever. But it is of the uric acid question that I would say a word. I have had a pretty large experience in the examination of chronic nutritional cases, and have made at least one thousand quantitative estimations of uric acid in the last five years, with the view of studying the effect of uric acid and urea and their relations to different diseases. In a considerable number of these cases I have found enormous quantities of uric acid excreted daily. In such cases I observed none of the manifestations that are ordinarily attributed to it by

Haig and his disciples. The result of my observations has been to convince me that the pathological importance of uric acid has been entirely overestimated outside of its local deposit in the tissues.

DR. J. HOLINGER, Chicago, Ill.—I am very sorry we have not heard more about the pathology of this disease. I would suggest that every one who has cases of hay fever should make careful pathological examinations of the air passages from the nose to the lungs. They would then find out how much ground there is for the theory that uric acid is the cause of the disease, a theory by the way which I never believed in. One of the speakers has referred to hay fever and asthma as half or twin sisters. I do not see why they should be called sisters simply because they have got one clinical fact in common. In regard to climatic influence, I may say that I have a brother-in-law who suffers from both hay fever and asthma, and sometimes when he goes to the mountains he gets free of them, while at other times it is *vice versa*. Therefore I do not think high and low pressure can have much to do with the disease.

DR. HAROLD N. MOYER, Chicago, Ill.—I would like to say a word in regard to that part of the discussion which relates to uric acid as the cause of nutritional troubles. Like Dr. McCaskey, I have made a great many examinations of cases of the kind referred to, though I can not say that I have gone into the subject as exhaustively as he has, and the result is that for several years no diagnosis of uric acid-emia has appeared in my books.

DR. MURPHEY (in closing).—As to the pathology of these diseases, undoubtedly there is an undefined and not easily recognized process going on in the constitutions of certain people that is the cause of migraine, asthma, hay fever, and other diseases. There is undoubtedly some uric acid present, but there are also conditions which have not been analyzed. The symptoms of hay fever are distinguished by the character of the excretions and secretions and the odor of the breath. You can almost diagnose a case of hay fever by the acid odor of the breath alone. It is the result of a physiologic chemical process going on in the body which has not been defined and which we are not in a position to define. Autopsies might assist us in this respect, as has been suggested, but I do not know of any patients who have died of the disease. Until it gets so bad as to kill a few people, I do not see how we are to find out the pathology by autopsies. As to treatment, I wished to bring out the fact that there are two remedies to be relied on—the diluted suprarenal extract in powder locally, and the bromide of gold and arsenic of which I have spoken.

VII. SOME OF THE EVIL EFFECTS RESULTING FROM THE USE OF ALCOHOLIC LIQUORS.

By T. B. GREENLEY, M. D.,
Meadow Lawn, Ky.

In writing on the subject above alluded to, it is almost impossible in a short paper to speak in detail, and therefore I shall only be able to mention some of the evils flowing from the use of alcohol.

It would seem, from the best statistics we have on the subject, that notwithstanding the great advances made in all departments of science within the last half century, the use and abuse of alcoholic liquors have greatly increased, resulting in its terrible effects, both moral and mental.

These conditions apply not only to our own country, but also to all European nations. We are somewhat astonished when we refer to the amount of pure alcohol per capita these nations drink annually. France stands at the head of the list, per inhabitant. Fourteen liters are allowed to each man, woman, and child. In Germany and Belgium, each, 10.5 liters, in the British Isles, 9.25 liters, Switzerland, 8.95 liters, Italy, 6.60 liters, Holland, 6.25 liters, United States of America, 6.10 liters; Canada, the lowest of any country, being only two liters per capita.

Of course we must consider that in all these countries there are many men, and a much greater number of women and children, who drink no alcohol; consequently, we must conclude that many who use it drink vast quantities.

The consequences of such imprudence in the intemperate use of alcohol is very suggestive to the minds of thinking men, in all its bearings, such as criminality, insanity, pauperism, and defectives in generative offspring.

France stands at the head of all nations as respects the quantity of alcoholic liquors drank per capita; and no doubt

it is the main cause of the greatly diminished birth-rate that country is now, and has been for years, laboring under. She has a lower birth-rate than any other country. In fact, if we compare the birth-rate of all the countries where the use of alcohol has greatly increased, we find the birth-rate proportionately diminished.

These conditions have been brougut about, mainly, in the last couple of decades. The last report from Great Britain gives the birth-rate at 29.1 per 1,000 population, which is much lower than formerly. Fifteen years ago it was 35.

Our own country has suffered in this particular as well as others.

Although the average longevity of man through the agency of scientific medicine has been greatly increased within the last century, the mortality due to alcohol has been increased. It is said that about 70,000 lives succumb annually in this country, directly and indirectly, from its poisonous effects.

A recent paper by Dr. William Carter gives the general death-rate of Great Britain from 1837 to 1872 as being without a change, but from 22.5 per 1,000 in 1872, it has fallen to 17.2. Classification study of these figures shows that of the ten general divisions of diseases and causes of death, there has been a steady decline in the death-rate in nine of the ten, and the exception is in the division of intemperance.

Here there has been an increase from 45 deaths per 1,000 in 1872 to 77 in 1897; but for this, the death-rate would have fallen to 14 per 1,000 of the general population.

The reduction in the death-rate due to ordinary diseases of over 5 per 1,000 from 1872 to 1897 is due to medical science in the treatment and prevention of disease; but it appears, unfortunately, that the medical men exert but little influence in controlling dissipation in the use of alcoholic liquors. Unhappily, it is feared that many of our confrères are indirectly the cause of its spread by its imprudent use in the treatment of some diseases, by which a habit is contracted.

In the estimation of the writer but little, if any, ardent spirits should be used in the management of diseases. In many cases, no doubt, injury results, rather than benefit, by its being regarded as a stimulant, when it is a sedative or narcotic. There is little doubt that many contract the habit by the use of patent medicines containing a large per cent of alcohol.

By way of illustration of the evil effects of alcohol on offspring, I will quote a few instances. Dr. Anthony tells of a healthy and temperate woman who married a man of excessive drinking habits, by whom she had five children. Four of them died within the first ten days, the other living to be nearly five years old. The husband died also, and the widow married again; this time to a healthy non-drinking man, by whom she had two healthy children, both living.

A noted scientist in the diseases of children has noted the progress of twelve families, who were the habitual users of alcoholic drinks, and of twelve families with total-abstaining parents.

During the twelve years these families were under his observation the twelve first-named gave birth to fifty-seven children, of whom twenty-five died in the first week after birth, five were idiots, five were dwarfs, and later one had chorea, ending in idiocy, and five others were more or less deformed and unhealthy, leaving only eleven of the fifty-seven to arrive at maturity in a healthy condition of body and mind.

The twelve families with temperate parents during the period of time were blessed with sixty-one children, of whom only six died the first week after birth, later, two only showed inherited defects of the nervous system, leaving fifty-three of the sixty-one healthy in body and mind.

These statistics are in accordance with the observation of the noted Dr. N. S. Davis, in his sixty-odd years of practice.

To further illustrate the evil hereditary effects of alcohol, we will give the history of a notoriously intemperate woman,

as related by a professor of the University of Bonn. The woman was born in 1745 and died in 1800. Her descendants during the last century have numbered eight hundred and thirty-four, of whom seven hundred and nine have been traced from their youth. Of these, seven were convicted of murder; seventy-six of other crimes; one hundred and forty-two were professional beggars; sixty-four lived on charity, and one hundred and eighty of the women led disreputable lives.

In 1894 the legislature of Massachusetts directed Horace G. Wadlin, Chief of the Labor Bureau, to ascertain how much crime and pauperism are due to alcoholic drinks. He consequently made a careful examination of the inmates of all the public charitable institutions, prisons, and asylums for the insane in that State in 1895, and published his report in 1896. The number of paupers examined was 3,620, sixty-five per cent. of whom had been addicted to the use of alcoholic drinks, and forty-eight per cent. had one or both parents addicted to the use of the same drinks.

The whole number confined under the correction of crime the same year was 26,672, of whom eighty-two per cent. were more or less under the influence of liquor at the time of committing the crime; 4,852 were under the influence of liquor when the intent to commit crime was formed, making ninety per cent. of the whole users of alcohol, and of these fifty-eight per cent. had drinking fathers and twenty-one per cent. drinking mothers. Of the insane, 1,836 cases were examined, fifty-two per cent. of whom had been addicted to the use of alcoholic drinks. Of these, sixty-eight per cent. had one or both parents addicted to the same drinks, and fifty-one per cent. grandparents with like habits.

When we contemplate such a pitiful condition existing in the staid old State of Massachusetts, from the effect of intemperance, what must we conclude the conditions to be in other States which do not set up such high claims in point of morality and good citizenship as the old Bay State?

There is but little doubt that the heredity of intemperance is plainly manifested in many families, and its pernicious results observed by a majority of the people. What must we say respecting the mental condition of parents who must know, in their sober moments, the danger that may result to their offspring from the excessive use of alcoholic liquor? The habit is so strong on them they have no power of resistance; therefore, we must regard them to some extent as lunatics.

It is almost impossible to name all the evils resulting from intemperance. It destroys the happiness of many homes, and causes at least two thirds of the divorce suits; it results in many cases of bloodshed and murder; it impoverishes many families. It results in producing feuds between families and neighborhoods; it ruins the health and causes the death of many thousands, and many other evils, *et id omne*.

Two friends may go to a saloon to treat each other, and after a few drinks, during the stage of temporary excitement, if they can not find an enemy to fight, they will attack and perhaps kill each other. This frequently happens; or they go home, and during a state of partial insanity kill their family, and perhaps themselves. This is a common occurrence.

When we take into consideration all the money cost of the drinking habit, we are not astonished at the terrible amount of crime, poverty, disease, and death resulting therefrom in our country. The estimate for last year of money spent for ardent spirits in this country was over $1,200,000,000. To be sure, the dealers in these liquors received the money, and no doubt paid the government and city authorities a great deal of it.

But do we think the income to the general government and the municipal authorities was a sufficient amount to pay the expense of prosecuting criminals, maintaining institutions for paupers, and the insane produced by the intemperance? We answer, it is doubtful. In this estimate we omitted the disease and death resulting therefrom.

I have frequently thought it somewhat strange that a people who claim to be the most wealthy, civilized, and religious in the world should love money so well as to promote crime, increase pauperism, disease, and death by licensing houses of disorder, called saloons, to dispense intoxicants. It may be inferred that half or more of our drunkards are produced by attending such places.

The question might be asked, Is there no remedy for the amelioration of such a condition of affairs? The answer is problematical, and might be said to be in the negative, as long as the love of the almighty dollar exists among certain classes of the people. In fact, we might say, it will last until the millenium comes. Really, its subsidence or abolition would be the inauguration of that happy time.

We will now say something respecting alcohol as a food.

Professor Atwater, not long since, in an article, claimed that alcohol, in reasonable quantities, served as a food. His reasonable quantities consisted of, say, three drams a day of alcohol, to the amount of 2½ ounces, divided into three doses, equal to about two ounces of whisky at each dose. He contends that this quantity is oxygenized and converted into food, serving as a generator of heat and nutrition. Now, we all know that a considerable quantity of this would be eliminated from the system through the kidneys and lungs. If alcohol is taken with food, or while food is in the stomach, it arrests the process of digestion.

It is admitted by all writers on the subject that alcohol is a poison; this is admitted even by Professor Atwater himself. This being true, how can it at the same time be a food? Do we know of any kind of food, such as we use from day to day, that a large quantity would act as a poison? Do we know of any kind of food that a large dose would act as a depressant or narcotic, reducing our body heat and strength and render us unconscious of our surroundings? Finally, do we know of any food that produces diseased conditions of the various organs, as the kidneys, liver, brain, blood-vessels,

etc.? We think not. It is well known that men in the army when allowed the use of alcohol can not endure the effects of fatigue, heat, and cold as well as those who do not drink. On this account it has been excluded in some armies by the officers. Therefore, alcohol can not act as a food and heat producer.

Knowing the evil effects of alcohol, and how easily the habit of drinking is engendered, the doctrine that it is a food is a very dangerous one to advance, even if it were true. No doctrine can please the whisky-sellers better than that of Professor Atwater.

It may be that Professor Atwater came to the conclusion that alcohol is a food from his observation of liquor drinkers becoming large and fat. He does not stop to think that this is the first state of drunkenness, due to the want of metabolic action in eliminating the effete matter of the body. He should have looked at the second state, resembling Shakespeare's "lean and slippered pantaloon."

Speaking of the influence of heredity in regard to the use of alcohol, it is claimed by some that association, perhaps, causes as many intemperate drinkers as the effect of heredity. We know how easily young men can be drawn from the path of virtue into that of vice, by association with immoral and dissipated comrades.

This may be done so gradually that the victims hardly become aware of it until it is almost past their will-power to halt in their downward path. Unfortunately, I have known samples of this character, some prominent in social circles.

In conclusion, I would suggest that if our profession would exert themselves in what might be termed a proper line of duty, as it respects the use of alcohol in treating disease, they can accomplish a great deal of good in preventing the formation of a habit in the use of alcohol on the part of their clientele. It is a great pity we have not more such men in the profession as the celebrated octogenarian, Dr. N. S. Davis, who has not used alcohol in his practice for fifty

years. We might also name the noted Dr. Crothers, of Hartford, who stands well alongside of Dr. Davis. These great confrères have had charge of hospitals, and treated thousands of cases successfully without alcohol.

In old times we now and then came across a patient restless, with mutterings of delirium, when we used a little pure whisky in the form of toddy, with benefit, acting as a narcotic; but now we have many things that will have the same effect without a tendency to produce a distressing habit.

I am indebted to our great confrère, Dr. H. S. Davis, for some of the statistics embraced in this paper.

VIII. SOME OBSCURE INJURIES FOLLOWING THE TOXIC USE OF ALCOHOL.

BY T. D. CROTHERS, M. D.,
HARTFORD, CONN.

There are many serious organic diseases which are traceable to syphilitic infections, also to heat and sun strokes, and also to brain shocks, concussions, or injuries from falls and blows on the head.

Sometimes the connection between these causes and the serious diseases which follow is very clear and can be traced in a continuous line of symptoms. In other cases it is obscure, with breaks in the history, and yet these causes as the starting-point of many grave diseases which follow can not be mistaken.

Alcoholic intoxication is the first cause of many equally serious diseases and neuro-psychoses, although this fact is largely unknown and unrecognized by the profession.

The familiarity with intoxication and the delusive theories of moral causation have repelled most efforts to study the pathology and psychology of this form of poisoning; hence the etiology of delirious delusional alcoholics on the streets and in the station-houses are literally more obscure and unknown than the etiology of yellow fever or the plague.

In this new study of the subject I will confine myself to the conditions which are traceable to the first toxic action of alcohol.

This may be divided into two classes.

1. The direct injuries which follow from alcoholic poisoning.

2. The psychoses following this state, manifest in the alcoholic craze and inebriety which follows.

As an example of the first form of injury, the following instance is an illustration: Many years ago I was called to see a physician whose intoxication was so profound as to be alarming. He had attended a supper at a medical society with some friends and drank several kinds of wine. This was his first intoxication. He had been a total abstainer up to this time, and both the taste and smell of spirits were particularly unpleasant. All his habits of life and living had been regular. He was considered a strong, healthy man, and had never been ill. He recovered the next day and went home. The only change observed was extreme paleness.

Several years later he consulted me and gave the following history: After this first intoxication he became anemic; had attacks of nervous dyspepsia; could not eat certain foods. Any overexertion or break in the regularity of his habits of sleeping or eating was followed by extreme exhaustion. Attacks of insomnia and headache followed, and his ordinary practice was a burden, only done with great mental effort.

He was filled with morbid fears of fatal mistakes and loss of reputation. He had been abroad six months and returned no better. All the physicians he had consulted had diagnosed neurasthenia with possible incipient dementia, and advised change and rest. He was morbidly introspective and was alarmed at the possibility of oncoming malignant disease of the stomach. He had grown thin and was anemic, and though at times he slept and ate well, yet indigestion and insomnia would follow. Various functional disorders frightened him so seriously that he would go to bed for days at a time, then get up and appear well again and attend to business with pleasant ease. Later he was obliged to give up surgery for fear of making mistakes, and seemed to have at times doubts of the correctness of his judgment, and gave unusual care and attention to confirm his opinions. This neuro-psychopathic state continued for two years, ending in

sudden death from what was called angina pectoris. He asserted that his condition dated from the injury following the first intoxication.

The second example was also a physician of forty years of age, temperate and in vigorous health. He had never been sick and had taken unusual care of himself. His ancestors were healthy, long-lived people, and there were no hereditary diseases in the family. He passed a rigid examination for a large life insurance a week before he was first intoxicated. Previously he had never used spirits or tobacco, both from principle and from disgust with the odor and taste of these drugs.

He attended a banquet in a neighboring city, and to the surprise of his friends, when urged, drank freely of wine and champagne. He returned to his home in a semi-delirious state, and later became stupid and remained in bed for three days. Then he recovered and went about his usual work. From this time his manner changed. His former cheerfulness merged into silence and reserve. He seldom laughed, and seemed absorbed in some mental study. He complained of insomnia, and seemed very anxious about foods and baths for himself. Six months later he was anemic and walked as if partially palsied. His sleep and digestion were impaired. He made no complaint; went about as usual, and when asked to explain his condition treated it lightly as some obscure nerve exhaustion. The next year hypersensitive states appeared. He complained of cold and sudden heat, and began to express fears of sudden death, and thought the condition malarious; took large quantities of quinine and antimalarial drugs. His mental condition changed. He was suspicious and irritable, and talked loudly at times and at other times would be reserved and seemed afraid to speak.

He consulted a number of physicians, who diagnosed brain exhaustion and advised change and rest. He spent a year traveling and came back worse, and a year later died suddenly of some sudden palsy. A post-mortem revealed nothing that would explain the cause of death.

The third example was that of a clergyman thirty years of age, in charge of a large church. He was a strong, athletic man, temperate, and had never used spirits or tobacco. There was no history of hereditary disease in his family, and he had never been sick. He was chilled from services at a funeral in a country cemetery, and given a large glass of cider brandy for warmth. This diminished the muscular power of his legs so that he spent the night at a friend's house. For other symptoms hot whisky was given, and he was considered

ill for two days before he could return home. From this time he became a nervous invalid. First, nutrition was disturbed. Food disagreed with him. Then insomnia and heart palpitation followed. Influenza, malaria, and various forms of neurasthenia were diagnosed. Rheumatism and stiffness of the joints succeeded. Then his mind became feeble and emotional changes followed, until two years later he resigned his charge and is now an invalid, unable to walk or bear any strain of mind or body.

The fourth example was that of a mechanic, forty-six years of age. He was a perfectly temperate man, never using spirits or tobacco and living in good surroundings, and was regular in work, eating, and sleeping.

After a fortunate sale of a patent in a distant city he was persuaded to drink with some friends, and suddenly became intoxicated. He remained in bed twenty-four hours, then returned home and called the family physician, and was supposed to have an acute attack of indigestion. From this time he was an invalid and appeared to be suffering from some obscure neurosis, with swellings of the joints and general nervous exhaustion. Five years later he gave up business and is now going the rounds of sanitariums for relief from paroxysmal pain and nameless functional and organic disorders.

These examples are given as marked types of neuropsychoses and psychopathies which are traceable and began with the first profound intoxication from spirits. In these instances an aversion to all use of spirits followed the first intoxication. No spirits were taken before this event, and there was a general impression that intoxication was the first cause of the disorders which followed. There was no hereditary history in these cases, and all the facts pointed to the first poison of alcohol as the active and exciting cause.

In two similar instances occurring recently, where an accidental intoxication was the starting point of serious and finally fatal neurosis marked by sclerosis and palsies, there was a history of previous hereditary psychopathies. It was evident that intoxication acted as exciting cause, rousing up a latent tendency to disease which continued to a fatal termination.

The second clinical phase of this subject is the psychosis following the first intoxication, breaking out later in some form of inebriety which is literally a symptom of the previous degeneration or injury.

I have found a number of less prominent examples where neuroses appeared soon after the first toxic poisoning from alcohol, that was supposed to be due to influenza. Thus, soon after the first intoxication, symptoms of influenza came on, and a long, distressing sequelæ of obscure diseases followed, ending fatally.

Malaria, rheumatism, and other symptoms of disease seemed to start from this point, although ascribed to other and insignificant causes.

The evidence that alcoholic poisoning was the specific cause was due to the fact that symptoms of functional and organic changes began soon after the intoxication, and also that there were no facts in the previous history which indicated these changes.

I have seen four cases of persons who used wine and beer in great moderation during periods of from two to six years; then suddenly they became profoundly intoxicated; recovered, and were total abstainers ever after.

Dating from the first acute alcoholic poisoning, various and most complex neuroses appeared, and diseases which were obscure and very difficult to diagnose and to treat followed, ending fatally in a short time. The specific cause, alcoholic poisoning, was not recognized nor the preliminary period of moderate drinking considered as a predisposing factor in the cases.

In my studies of a large number of both alcohol, opium, and other inebriates, a certain proportion of instances have a history of one early, profound intoxication, and then after years of abstinence they merged into a continuous addiction to spirits or some narcotic drugs. An interval of years may have passed from the time of the first intoxication, during which they were total abstainers, and in some instances

promoters of the cause of temperance. Then suddenly, without apparent cause, they became addicted to the use of spirits and drugs.

The mental symptoms in such instances are often so prominent as to suggest a long preliminary state of degenerative changes, dating from the first intoxication.

The remark of friends and near associates that such persons were always queer and peculiar in their thought and habits is a confirmation of the expectation that neurotic changes had been going on long before the breakdown.

The following is an example under my care: A young man of good health and family history became profoundly intoxicated on his graduation from a law school. For ten years he was a hard-working, temperate man, and although successful, was eccentric. He would suddenly stop business, go to bed, and abstain from food for two or more days, claiming to be exhausted and threatened with congestion of the brain. The family physician considered it largely hysteria, and could find no tangible cause. Both in his business and in regard to himself he was erratic and changeable in his plans, and spent much time reading books of health. Suddenly he began to use spirits daily and soon became an inebriate. There was doubtless a connnection between the first intoxication and the inebriety years after. This was evident in the neurotic symptoms and changes during this period.

Persons who become neurotics in the best conditions and surroundings of life and then unexpectedly drink or take drugs to great excess are often found to have a history of some early profound intoxication, with slow recovery. These instances are unrecognized, but can be traced in many cases, and the connection between the first intoxication and the later stages can be established without much doubt.

A leading business man became intoxicated at a wedding for the first time in his life, never having used spirits before. He was sick for a week, then recovered. From this time he was conscious of increased nervousness, loss of power of attention, was fearful and worried about matters which previously gave him no concern. He described his symptoms

by the phrase that "he had lost his nerve" and could not control himself as in former times. He complained of weakness and disinclination to either think or act, and said it all dated from the intoxication at the wedding. This increased until a year later hemiplegia appeared. Two years afterward he died of some acute disease. The interval between the first toxic poisoning was marked by distinct symptoms of both mental and physical changes and fatal breakdown, which have not received any study so far.

Many persons become intoxicated at long, irregular intervals, depending on some unknown causes, and while there are no pronounced symptoms of neuro-psychical disease which attract attention, there are other symptoms of debility and weakness which are overlooked. Such persons suffer from organic and functional disorders and acute diseases that are ascribed to other causes. Neuritis and obscure forms of so-called rheumatisms are common. An instance occurred recently of a physician who was seized with what was called an attack of rheumatism, and after a few hours of acute pain died. It appeared that for the past five years he had been intoxicated at least six times, and on each occasion suffered from severe pains in the legs and severe heart depression. The last intoxication was four days before death, and he was out as usual attending to business the day after drinking. No doubt there was some connection between the alcoholic poisoning and the death, which was not recognized.

It may be stated as a fact that every intoxication from alcohol is both a physical and psychical concussion to the brain centers, and the beginning of both organic and functional changes which may go on rapidly or slowly. Frequent intoxications develop imbecility and masked dementias. This is seen from any careful study of chronic inebriates. The resisting power of the brain to continued intoxication varies widely, yet it is evident that after certain changes have taken place the action of spirits may seem less acute and prominent, but the degeneration is continuous. Like repeated blows on the head, the effects are cumulative and finally merge into well-marked organic neurosis.

The phenomena of intoxication from alcohol are familiar, and yet their physiological and pathological significance is largely unknown. An outline view will be of interest. The first glass of spirits produces a sudden flushing or blanching of the vaso-motor circulation of the blood to the face. The facial muscles are first agitated, then become fixed and have a stolid, palsied appearance. Or they may twitch and quiver for a time, then settle down into a stolid, fixed state. The lips seem more firmly compressed and when used rapidly have a spasmodic movement. The eye appears bright and glittering, then becomes suffused with tears and rolls about in an unusual way or settles into a fixed, palsied look. The voice is altered. Words come hurriedly or slowly or very smoothly glide into each other, both with or without an effort. Respiration is quickened and a sense of shivering and agitation pervades the body. Brain activity is suddenly increased, rapidly merging into confusional states, with difficulty of utterance. When more spirits are taken all these symptoms deepen. The first shock from a sudden interruption of the normal rhythmical flow of nerve energy passes away and a delusional period follows. This is anesthesia, with buoyancy, comfort, and rest. The first action is that of shock and profound alteration of the functional activities of the brain. Later the special senses become impaired. Sight is diminished. Hearing is dulled. Feeling, taste, and smell are lowered. There is a fall in temperature. Muscular power is enfeebled. Memory is weakened. Rapidity of thought and power of concentration, with conception and perception and judgment, are all more or less paralyzed. Stupor and unconsciousness follow. Before this later stage a period of exaltation and delusional confidence in ability to think and act more wisely and clearly is nearly always felt.

There is in all forms of intoxication, first, a shock and concussion to the brain and nerve centers. Second, a period of anesthesia of the higher and sense centers, with delusional exaltations and boldness of mind. Third, these all finally merge into stupor, palsy, and unconsciousness.

The so-called stimulation is irritation and paralysis.

Psychological measurements of the brain and sense functions, as well as the organic functions at their early period, show palsy. Yet the theory of stimulation is accepted as a true explanation. Each intoxication is a profound sudden paralysis of the brain and nerve function.

A concussion from chemical agents acting in some unknown way, raising the heart's action, then lowering it, acts with especial severity on the higher brain centers.

The feeling of comfort, exaltation, and superior vigor are delusions. The theory that the action of spirits will give new power and force in an emergency is an error. It brings recklessness and loss of judgment, with failure of the finer conceptions of the relations of things, but nothing more.

When alcohol is used to the state of intoxication it s always followed by symptoms which show in some degree the injury which has been done. The common sequelæ of intoxication are headache and exaggerated sensations of head and stomach, with extreme debility; these are significant signs of injury. The acuteness of these symptoms calls for more spirits, and finally the suffering subsides because the higher sense centers are blunted and anesthetized and fail to register the pain impressions.

From our present knowledge of the action of alcohol on the brain and nervous centers we are sure that recovery from its toxic effects is slow, and in some cases almost impossible. The damage may be covered up and not be clear except from a minute study of the symptoms, and yet it exists.

Intoxication soon after or near the age of puberty has been the starting-point of very serious neuroses which continued years after, often breaking out in some neurosis or form of inebriety.

Profound intoxication at from forty-five to fifty is very serious in the entailments which not unfrequently follow from it.

Some of the facts which I wish to make prominent are these:

1. Intoxication from alcohol to the extent of coma, with profound relaxation of all the functional activities of the body, is often a serious injury to the brain and nerve centers, and is followed by neuroses and organic change.

2. The significance of alcoholic intoxication in the study of obscure diseases can not be overstated. It may be both an active and an exciting cause and should always be considered in neuro-psychopathies or other disorders that follow.

3. Intoxication at puberty and in middle life is often the starting-point of a circle of disease which is usually ascribed to other causes.

4. Intoxication always predisposes to the diseases of inebriety from alcohol or opium, which may come on suddenly at any time in after life.

5. Poisoning from alcohol is far more serious than supposed, both in its effects and the neuroses which follow.

DISCUSSION OF PAPERS BY DRS. GREENLEY AND CROTHERS.

DR. G. W. H. KEMPER, Muncie, Ind.—The gentleman from Kentucky has given us a good temperance lecture. What both he and Dr. Crothers have said about the hereditary influence of alcoholic liquors is of the utmost importance, and I think we are much indebted to them for the information they have given us on the subject.

DR. C. H. HUGHES, St. Louis. Mo.—I think we are all practically agreed that the world drinks too much. The important question is that raised by Dr. Crothers by these four clinical cases, namely, When, why, and how do alcoholic liquors affect the nerves? My conclusion is that to administer alcohol judiciously we should administer it only proportionate to the powers of nervous resistance, that it should always be well chaperoned with an abundance of water and adequate accompanying nutrition and given with as little frequency as possible. In the four cases reported by Dr. Crothers the patients were all in an exhausted condition and the results were only what might have been expected.

If a man uses alcoholics at all he should choose the place and time and choose it physiologically, and he should always take plenty of water or milk or other dilutent with it to meet and antagonize the affinity for and demand of alcohol upon the water of the tissues of the body. The fire extinguisher should meet and resist the fire, otherwise the tissues suffer.

DR. EMIL AMBERG, Detroit, Mich.—It is astonishing to find how injurious even the moderate use of alcohol can be. It is a common mistake to think that it acts as a stimulant in producing intellectual effusions. A man who drinks when he is writing may think he is producing brilliant matter but afterwards he is apt to find to have written nonsense. The experiments made in the laboratory of Professor Kraepelin, in Heidelberg, concerning the effects of alcohol, are of fundamental importance.

DR. B. T. WHITMORE, New York City.—There was an interesting discussion on this subject at the meeting of the British Medical Association. It occurred in connection with the supposed arsenical poisoning of large numbers of beer drinkers in Liverpool and Manchester, and statistics were quoted in regard to the quantities of beer consumed in England and whisky in Scotland, with the view of providing data for a comparison of the effects of these drinks. They did not establish anything conclusive beyond this, that while in the case in question arsenic may have increased the irritating effect of the beverage, both beer and whisky drinkers, if they drink to excess, are liable to acquire a nervous affection which is to be attributed solely to the alcohol.

THE CHAIRMAN.—In regard to heredity, a remarkable fact is that very often the effects of alcohol may skip one or more generations. Women, too, it is to be remembered, are liable to be affected as well as men. A woman, owing to social considerations, will hesitate longer than a man about commencing to drink, but it too often happens that once she starts it is almost impossible to break her of the habit, as she seems to lose all respect for herself. I agree with Dr. Hughes that when alcohol is taken it should be accompanied by plenty of water. It is well also to eat something at the same time.

IX. "DENTISTS' NECK," AN UNDESCRIBED NEUROSIS.

By ALBERT E. STERNE, A. M., M. D.,
INDIANAPOLIS, IND.

It has been my desire for some months to call attention to an affection that I consider an occupation neurosis. So far as is known to me this condition has heretofore never been described. When first it attracted my own notice I regarded the affection as unique and of seldom occurrence, but as similar cases began to multiply in my practice I was forced to the conclusion that it was by no means rare and that it sometimes attains the dignity of seriousness to the afflicted individual.

This condition I have denominated "Dentists' Neck," because it designates at once both the region to which most of the symptoms are referable and the class of persons usually affected. At the same time it is a confession on my part of ignorance of its exact pathology. Indeed, the latter is to me largely a matter of speculation and theory, although I believe my conception of its nature comes very near to the truth.

Permit me to depict this condition as clearly and concisely as I can. As its name indicates, the affection commonly finds its victims among dentists, and the part principally involved is the neck region. In every instance that I have observed this has been the case, and for the most part the symptoms shown, the course of the malady, and its reaction to proper treatment have been characteristic. It has been my good fortune to carefully study ten cases during the last three years, and all of them have been similar in a general way. In fact, the differences were rather of degree than of quality.

These ten cases I have been able to study with considerable accuracy, some of them consecutively for several months, and I feel, therefore, that their number is sufficient to warrant a description at the present time. In addition to these, however, I have taken occasion to speak with many dentists concerning this subject and I find that minor degrees of the affection are quite common. These minor degrees may be properly said to represent the beginning of the malady. They are as follows: A vague sense of weariness and aching in the neck muscles, and a subjective feeling of stiffness between the cervical vertebræ. Sometimes the memory and sight are also involved. Taken at this stage the condition is mild and easily eradicated by proper treatment. If, as is usually the case, these prodromal symptoms are disregarded or looked upon as merely of transitory rheumatoid nature, they develop readily and rapidly into actual pain and stiffness, either unilaterally or bilaterally, of the entire neck region, and the former vague sense of weariness becomes so intense that the patient finds it almost impossible to maintain the head in any position except by the utmost effort. Where formerly he had at least been able to accomplish some part of his work with a fair degree of comfort, and where he had attained relief by resting himself for a time, he now becomes afflicted with constant aching which even rest does not dispel. When he attempts to exert the affected region, quite aside from his ordinary avocation, he realizes that the effort is attended by great distress.

Taken at this stage, which I regard as of medium grade only, the malady reacts favorably to proper measures. If these be not resorted to—and the patient merely desists from his work without proper treatment—the affection increases in severity and finally becomes intense enough to completely disable the victim, whose suffering may grow almost intolerable and render sleep out of the question. At this stage other symptoms aside from the pain and weariness and stiffness of the neck structures become manifest. Some

of these I regard as distinctly peculiar to and connected with the malady itself; others are extrinsic to it and depend upon the lack of sleep and apprehension of the patient, who finds himself unfit for work.

These symptoms are radiating pains into the arms—notably the "working arm"—muscular weakness and tremor of the arms and hands, occipital headache, and a noticeable twitching of the platysma myoides on one or both sides. Eyesight is usually involved. Sometimes the patient asserts he feels "perfectly well and strong" otherwise, but more frequently the entire physical condition becomes low, as one might reasonably await, where constant pain is associated with loss of sleep and apprehension.

We have then a complex of symptoms made up of aching or pain in the muscular and ligamentous attachments of the cervical region, rigidity of the cervical spine, weariness of this area as the classic signs of this affection; radiating pain and fatigue of the arms, occipital headache, and twitching of the platysma as accompanying intrinsic features, and insomnia, with its attending general symptoms, as extrinsic features of this neurosis. Probably the condition can be best illustrated by the description of a case, one which shows all of the features I have depicted. It will not be necessary to weary you with a recital of other cases more or less severe in character.

Dr. S. D. S., of Union City, Ind., referred by Dr. Granville Reynard; 35 years of age, first came to see me July 27, 1900. He had been suffering from "stiff neck" for about ten months. The malady began with slight stiffness and weariness while following his usual routine of work, and was associated with restlessness at night. At times he would seek temporary relief by abandoning his duties, but as weeks went by he found work became more and more difficult and relief harder to obtain. Gradually the right shoulder and arm became similarly affected and at times radiating pains would "shoot across the shoulder into the arm." Usually the pain was of the "dull or aching sort." The head grew more and more fixed in posture, inclined forward and somewhat to the

right. Eyesight became slightly involved. Occasionally he would experience twitchings of the platysma and some tremor of the lips and the right arm. Always there was present a great sense of weight in the right arm and shoulder region and intense weariness and aching in the neck. The latter did not grow perfectly rigid, but was held in a stiffened way. Sleep, at first only restless, gradually grew less and less. His condition was supposed to be rheumatic, and he went to Hot Springs for a time, but found no relief there. Finally he consulted an eminent Ohio surgeon, who told him he had tuberculosis of the cervical spine. With this diagnosis he was sent to me, naturally completely disheartened by the surgeon's verdict.

A careful examination revealed the following: Slight lordosis of the cervical region. Head held stiffly and to the right. Movements of the head were circumscribed in extent, but all were possible to a slight degree. The movements themselves created little pain, either actively or passively carried out, although the patient complained of constant pain when at rest. Almost no "scraping" was heard and no "crunching" was felt under passive movements of the head. The right arm seems somewhat weak, the shoulder girdle muscles somewhat stiff, but little resistance was offered to passive movements of the right arm at the shoulder joint.

No organic symptoms were shown upon the part of any vital internal organ; the central nervous system showed itself intact. All reflexes were normal. He was what would commonly be designated "very nervous." After weighing the matter very carefully, I felt I could assure him that no tubercular process of the spine existed, in spite of the dictum of the Ohio surgeon. On the other hand, I felt equally sure that his condition was purely neurotic, though upon a probably rheumatoid basis, and was entirely due to his work and the constant strain upon the structures of the neck caused by long-continued work in a constrained position. I took good care to explain to him the great difference between his condition and caries of the cervical spine, dwelling especially upon the lack of intense pain on movements of the head, and rendered a fair prognosis provided he carried out systematic treatment.

In a week's time he returned to my sanatorium, where he remained for nearly ten weeks. Under the treatment which I shall outline below he steadily improved, and after several months of further rest and care was able to return to his professional duties, but only by accustoming himself to an entirely new position when at work. A year has well-nigh

passed since I dismissed him from active treatment, but during that period he has suffered comparatively little inconvenience and no actual recurrence of the severer manifestations of the malady. It should be stated, however, that he has not attempted to do nearly so much professional work during the past year, residing much of the time upon his farm near Union City. This case I regard as typical.

When I come to speak of the character and pathology of this affection I am, as I frankly confessed before, forced to a great extent to surmises and conjectures. No case I have ever observed has been fatal. This is, I believe, of slight import, inasmuch as I do not believe any organic substructure exists in these cases, beyond actual congestion of the tissues and possibly some fragmentation of the muscular structures and thickening of the external covering of the cervical vertebræ. So far as the nervous system *per se* is concerned, I regard the malady as purely functional, *i. e.*, a neurosis.

It is highly probable that all of the structures involved, that is, muscles, ligaments, bones, in the neck region are in a high degree of congestion. It appears to me not unlikely that some fragmentation of muscle fibers and some thickening of the vertebral periost actually occurs. This thickening may also extend into the nerve sheaths. The nerves themselves, however, I believe remain quite intact.

The changes in the brain are purely cellular and functional, but I can form no conception of this malady without supposing that these changes actually occur in the form of cell fatigue, a localized neurasthenia. No real cell déstruction probably takes place in these and analogous conditions. This is the first mention of analogous. I believe we have them, and the right to compare them with this condition of which I am speaking.

"Dentists' neck" is certainly comparable with other occupation neuroses, not only in its etiology of regionary overstrain, but also in its cerebral functional character. In this connection I wish especially to mention "writer's

cramp," "telegrapher's arm," "ball-player's arm," "stenographer's and typewriter's arms," etc. These are, I conceive, all of them associated with localized brain cell fatigue in addition to the peripheral manifestations. In fact, I am inclined to consider the latter as secondary to the former; in other words, that they are all pure neuroses of localized nature.

In addition to this more circumscribed view of the pathology and nature of this affection, I have found it necessary, both as regards its character and etiology, to consider a broader, more constitutional factor in play. Experience and the results of treatment have taught me that this conception is correct. All of these affections arise upon a predisposing fundamental state or diathesis. The cause of this condition is at least a twofold one. First, there is undoubtedly a vulnerable nervous system predisposing the individual to these manifestations. The basis of this vulnerability frequently lies in a rheumatoid or lithemic tendency. Second, the occupation of the individual—which places constant and often excessive demands upon the neck region and upon the brain cells primarily supplying this region—is a factor of the utmost importance in understanding the brain cell fatigue. Personally I have observed no case of "dentists' neck" in which the underlying diathetic rheumatoid or lithemic tendency was not well marked, both in the symptomatology and course of the malady. Furthermore, the treatment of the diathesis was always necessary to attain good results. It was never sufficient to treat merely the local condition. And this naturally leads me to speak of the treatment of these cases.

Treatment.—This consists largely of regular electro-massage of the neck, principally along the cervical spine as far up as possible and as low as the mid-dorsal region. I have found the high-tension alternating current the most useful. Static sparks may be employed, but this method is very painful and severe and should not be used when the former current

is available. This treatment is given twice and sometimes three times daily, each sitting of about fifteen minutes' duration, and followed by an alcohol rub. Salicylate of methyl is even better than alcohol when a rheumatoid basis is evident.

It is essential that the patient rest, with the head well pillowed, for at least an hour after each sitting. Where the arm or arms are involved, these parts are similarly treated, and whenever any marked physical debility exists the entire body should be worked over once daily, though less vigorously.

Internally liberal quantities of pure water or lithia in water should be administered, a glass every hour between meals, if possible. Salicylate of methyl, three drops in fifteen drops of pure oil of wintergreen in capsule form, I have found especially valuable. It will be recognized that this method is largely constitutional, and it is necessary never to lose sight of this fact in the therapy of this and similar affections.

A feature of great importance is the working attitude of these patients. It is imperative that this be changed from that usually and formerly assumed. Dentists showing the first signs of this affection should be cautioned to alter their posture while operating. It must be recollected that such individuals often work steadily for hours at a time with the head bent forward and to the side, the vertebral column inclined and frequently upon rather insecure footing, inasmuch as the one leg is often used to propel a motor drill.

A moment's reflection will show that such a bodily position imposes great strain upon the muscles and ligaments of the cervical spine. This strain must be relieved, and this can be done only by assuming, or learning to assume, some other posture while at work. If it were possible to be seated upon a stool with the head held well back, I think dentists would suffer less from this neurosis. However, when once this is established, mere measures of this character and complete rest do not suffice. In this respect the malady is similar to "writer's cramp." As soon as work in the old way is resumed the symptoms quickly reassert themselves.

Complete rest for a time is almost essential, always so in severer cases. It would be wise to resume professional duties only gradually, taking up what can be accomplished without evidence of fatigue or pain. If these obtain it is an absolute indication that too much is being attempted.

In very mild cases it is possible to allow the patient to carry on his work during the period of treatment—always covering several weeks, and maybe months—provided that he devote time enough to this treatment, and work under a less strained posture. Under no circumstances, and no matter how mild the case, would I counsel his attention to work during an entire day. Either morning or afternoon, but not both, until he shows practically no more symptoms of the trouble, and has attained a high co-efficient of resistance to the manifestations of fatigue.

To this phase of the subject I have accorded more attention, because I realize the difficulty of making such patients recognize the necessity of treatment in the earlier stages, when they are apt to make light of it; later on they feel convinced of their mistake. Therefore it behooves the physician to be most emphatic upon these points.

Diagnosis.—The diagnosis ought not to be difficult. It must be borne in mind, however, that this condition may be met with among individuals who are not dentists, but whose vocation also places great strain upon the muscles and ligaments of the neck.

Differentially this affection should not be confounded with ordinary torticollis. In the latter the sterno-cleido-mastoideus is almost solely involved. Furthermore, it is important not to regard "dentists' neck" as merely neurasthenic, though, as I have insisted, the condition is one of localized cellular neurasthenia so far as the brain is concerned.

Tuberculosis of the cervical spine differs from this affection not only as regards its symptoms and character, but the nature of the pain is different. Ordinarily passive movements where there is a tuberculous process in play are very

painful and there is evident roughness of the articular surfaces. The treatment outlined above would be eminently unfitted to any localized tuberculous affection, whereas in the condition I have termed "dentists' neck" it has proven very satisfactory.

DISCUSSION.

DR. TRUMAN W. BROPHY, Chicago, Ill.—I find myself in an embarrassing position here this morning, for the secretary has put me on the program to open the discussion of a subject quite new to me. While I appreciate the honor and feel very grateful to Dr. Sterne for presenting the subject and calling the attention of the dental profession to a matter so much affecting their interest, I feel myself wholly incompetent to discuss it, as I have very little knowledge regarding it. Indeed, until I was informed of this paper, I was not aware that any particular nervous affection was classed as the "dentists' neck." However, I can well understand that the dentist, being a hard-working man whose occupation requires him to pass most of his time in a cramped position, must naturally be subject to a nervous strain not usually observed in others. This is no doubt contributed to by his confinement and long hours, and also by the nervous exhaustion which results from his work, though the principal cause may be the position that he occupies, generally upon the right side of his chair with his head more or less continuously in the same position leaning over his right shoulder from day to day. As to the etiology of the affection I know absolutely nothing more than can be deduced on general principles from the possibilities of the conditions as they arise. It is true that the dentist, after he has passed along to middle life with a full practice, is often subject to neural disturbances, and frequently breaks down from nervous prostration, and after hearing the special symptoms and conditions of dentists' neck described by the essayist I recognize that I have known a number of men who have suffered from all the symptoms referred to without knowing what the true cause of the disturbance was. I believe the disease is brought on by the nerve strain which is caused by the position and circumstances described. I wish I could discuss the subject in a manner more in harmony with its deserts, but for the present I must confine myself to an expression of thanks to the author for his contribution.

DR. H. N. MOYER, Chicago, Ill.—I have never so far seen a case just like the condition described, but it is clear what

the nature of the malady is. I think the term "dentists' neck" is unfortunate, and yet I would not like to suggest offhand anything as a substitute. If we were to class it with housemaid's knee we would be confronted by the fact that the latter is not a neurosis. If we were to put it in the class of occupation diseases, it would have to come into the same class with the fiddler's finger. If it is of a neurasthenic nature it would come into the class of fatigue neuroses. Possibly all these underlying conditions may be present. We are prone to neglect the differences that exist in such cases. It might, if in the first group, be inflammation of the connective tissues. If in the second group, it would be an occupational neurosis. We know how the latter again are associated with neurasthenia. On the other hand, there are occupational neuroses which have no connection with neurasthenia. The possibility also should be borne in mind of this condition being grouped with maladies due to local neurasthenia—in other words, fatigue of the nervous system, expressed locally, in those who have a vulnerable nervous condition and are exposed to a strain of particular parts of the system.

DR. G. W. MCCASKEY, Fort Wayne, Ind.—I think we are all indebted to the author for presenting this subject to us. However, I doubt the advisability of adding another to the list of names of maladies, nor do I think in this case it is necessary. The pathology of the affection may be easily surmised. Fundamentally the condition is due to a neurasthenic and toxic state. The occupation of the dentist is of a very sedentary character, and the cramped position in which he has to remain while working would naturally produce a local neurasthenic, congestive, or even inflammatory action.

DR. F. SAVARY PEARCE, Philadelphia, Pa.—I think something should be said as to the mechanical aids and devices by which this condition could be avoided. For one thing, I would suggest that it would be well for dentists to cultivate ambidexterity, so as to have the strain alternately on different muscles. Then dentists are prone to become sedentary in their habits. They do not take sufficient exercise. They should take warning and see what can be done to render their work less injurious. Massage is a useful agent in those men who are too busy to obtain out-of-door exercise.

DR. EMIL AMBERG, Detroit, Mich.—I think that dentists' neck might in the beginning of the disease, perhaps, come in under the head of muscular fatigue. Judicious massage coupled with rest might afford more relief than anything else. Dr. Sterne spoke of the beneficial effect of rubbing. It seems possible that elimination of some toxic substance from the muscles may take place by this treatment.

DR. STERNE (in closing).—I thank the gentlemen who have spoken for the way in which they have discussed the paper. I brought this subject up with a good deal of trepidation. Like Dr. Moyer and Dr. McCaskey, I feel that we have enough of names for maladies, and I only called this "dentists' neck" to indicate briefly the condition I intended to describe, and because I could not think of a better name for it. Dr. Moyer has said that he never saw this exact condition. I am sure that if he had he would have paid more attention to it. It happens to all of us that having once seen a case in which our attention is attracted to particular conditions, other cases of the same kind are apt to come under our notice. And so it was in this case. Perhaps it was to some extent because I was looking out for similar conditions, but the result was that I found that quite a number of dentists are in the habit of suffering in the way I have described. At the outset I was inclined to think, like some of those who have spoken, that it was nothing more than a local inflammatory condition; but I do not believe that any more. It may begin in that way, but I have doubts even as to that. I think the cerebral affection is the primary and principal one. I am satisfied that it is not merely a local affection, otherwise it would recover by rest and local applications. The nerve cells seem to have lost their power to rest. I wish Dr. Moyer could have suggested a better name for the malady. All diseases that have arbitrary names, such as Bright's disease, would be better understood if they could be designated by some word that would be suggestive of the pathological conditions involved. I do not pretend to know more about the subject than any one else. I only happened to have my attention directed to it, and as we had a dental congress recently in Indianapolis I had an opportunity of making inquiries, and I found the complaint very prevalent.

X. THE ACQUIREMENT OF NERVOUS HEALTH.

By F. SAVARY PEARCE, M. D.,
PHILADELPHIA, PA.

A somewhat paradoxical title, you may say, I have chosen upon which to address you. This is true, but in the chess-game of life paradoxes do come, and even figurative English at command will not quite permit a visitor with you to-day to use better terms to describe the full meaning of this broad subject under discussion.

We should like to contrast the traditional three B's—brains, brawn, and belly—against the three W's—wine, women, and worry—as complementary trios of the state of nervous health of people, but 'tis too old, yet an unheeded story. I am not desiring to go further to-day than toward a study, therefore, in pathogenesis of nervous diseases. That some potent sources of the acquired nervousness so frequently seen in American life does exist, all will admit. What a pitiable sight to behold, since, too, prevention is at hand. The evil predisposing causes can and should be largely eradicated. We are to advise, then, ways to prevent peoples and individuals from becoming liable to and to actually suffer functional nervous diseases, people on the verge of nervous breakdown; or those who, by abusing certain privileges in living, shall surely bring on a collapse in due time. Here alone can we withdraw the mote.

It is more frequently in those who are not the subjects of a nervous heredity too that I call your attention toward in advising for wider prophylaxis in medicine, especially in nervous and mental disease. It is this class of business man or woman, for example, who has no warning of his doom, for as Dr. Weir Mitchell has ably set it down, the nervous system's "wear and tear" is not felt as pain, which is the dominating guide to the average man for his assuming self to be ill.

The more less learned laborer does differently. He seeks rest from the comfortable tire of his muscles, and hence seldom collapses. Would it were that we could assign his intellect a place in the apparently more conservative plan of life he pursues; but alas, 'tis but nature's force for the healing balm to assert itself—sleep. Recapitulation and assurance of success in bringing about nervous health in persons of nervous temperament impels me to go on more in detail. I have had no more grateful patients than those who had been guided away from that baneful state of health—"general nervousness."

Signs of Insidious Nervous Collapse.—Loss of memory and lack of concentration in a banker or professional man is of serious import, and should be the signboard to warn him from the precipice down which he will surely fall with a crash more or less severe to his nervous health. And, in my experience, let a man past forty years insult his nervous system to such degree as to become a typical neurasthenic, and such a one can never quite recover. Health ever after becomes a delusion and a snare. He will work in starts, but continuity of labor I have never found for days at a time in such people, even though no somatic signs present. Depending also upon the condition of the gastro-intestinal tract, governed by the sympathetic system, will we have symptoms in warning of a nervous breakdown which the patient or every physician perhaps will judge as a transient "wind dyspepsia," but which to the trained physician will be a signal warning of serious auto-intoxication, for as a sequel, mal-nutrition of the central nervous system occurs. Indeed, the sympathetic asthenia thus prevailing means, of course, loss of control of the great involuntary functions of the human body, especially of metabolism, so vital to the nervous health. Then circulatory disturbances, brought about by overwork of the sympathetic system, adds another masked evil by lessening the proper blood supply to the several cerebro-spinal nervous centers, and at once the pathogenesis of neurasthenia or

other serious maladies is surely established. It may be a hysteria, that disorder of the emotions which is recognized so frequently but the further study of its cause and hence detail treatment of which is so frequently neglected; the loss of confidence the patient has in his doctor being in the great majority of such cases undoubtedly due to the lack of fullest understanding of the case written so forcefully, though subconsciously, upon the physiognomy of the physician.

Here it is in place to mention the value of a recent work, "Unconscious Mind," by Dr. Schofield, of England, which elucidates the pith of this influence of mind over matter in a practical way. That favorable metabolic changes can accrue from a bright mental state I have seen in not a few cases of melancholia, where persistent efforts, as in conversation and music for the sufferer, was a winning card to cure. An intelligent nurse or attendant is a *sine qua non* for success here.

There are two classes of acquired nervousness which should be judged from a civic or social point of view rather than from the medical aspect: *A*. Cases due to inevitable causes, such as worry over calamities in a family; *B*. Cases following absolutely preventable causes, such as worry over occurrences of every-day life, which the high-strung American takes on almost with a studied effort. There are distinct cases coming under both of these headings which must be carefully selected before the physician can hope for anything like success in the prevention of nervous and mental disease of the insidious types to which we are confining the paper.

I shall now endeavor to bring out the salient points in cases to be recited where the advice given, being weighed and carried out by the sufferer thus instilled to hopefulness, wherein the suppression of dire results were pretty positively avoided.

CASE I.—Mrs. B., aged 40. Always a healthy woman, in the better walks of life, who brought up a family with due indulgence as a mother, and as a finale sought the happiness

of her daughters naturally enough through marriage. In this she had been successful save in the case of the eldest daughter, who was married with great éclat to a man whom the mother, with a sudden shock, discovered was a dipsomaniac and the daughter was doomed to a life of mortification, to say the least, in which the mother, our patient, shared tenfold, and a melancholia followed which medicaments, change of scene, and the whole gamut of desirable methods of treatment I am sure will never quite overcome. The above case, which need not be detailed further, is an example of the "inevitable abortion" of endeavor to cure, so well phrased by our obstetric confrères. On the other hand, I would feel certain of prompt recovery in this woman if the mental depression could be wiped away by regeneration of the son. Loss of her mental health will constantly be the fruit from such seed. The mind alone dominates this case.

CASE II.—Miss Y., aged 30. A subject of hystero-neurasthenia of distinctly acquired type, due to the same baneful influence—an alcoholic brother. The patient has been completely restored to health since the abandonment of dissipation by the brother, to whom she was entirely devoted. My efforts were to create a cheerful frame of mind through rest, cure, and fattening. The brother did the *real* cure.

CASE III.—Miss R., aged 34. A woman in perfect physical health and without any heredity as to nervous disease whatever, through a life of lack of the initiative, and in which endeavor was never considered essential, at the age mentioned came to a mental status pitiable to observe, in which there was no interest in life and in which she felt there was physical breakdown dominating her state, from the extreme weakness on exertion and palpitation of the heart, etc. The usual methods of the general practitioner, who did not attend the mental aspect, failed. Finally charlatanism was resorted to, with the result of greater complications in the case. With the careful elimination of organic trouble by a thorough examination, the patient was impressed with our statement that no physical debility existed. The plain advice of regulation of life, with definite duties of an intellectual and physical nature, such as light reading, rowing, and calisthenics, have acted as sheet-anchors for beginning a cure which seems will ultimately come.

CASE IV.—Dr. K. Is an example of that general nervousness coming on at the age of 30 years in a man of athletic tendencies and good physique. He was a track-runner of distinction in college days. From lack of proper proportion in his mental and physical work after graduation he became

the subject of general nervousness, fidgetiveness well expressing the motor excitability, while persistent disturbances of circulation were manifest by leaky skin and coldness of the extremities, while vertigo of distinct objective type harassed him much in locomotion, but when an attack was forewarned lying down would give relief by restoring the proper flow of blood to the central nervous system.

Here was a case that by exclusion we decided was neurasthenic, largely of an active (muscular) type. The man is of extreme intelligence and carried out our detailed advice—the one in a thousand.

By cutting down tobacco and stimulants to almost nil, slowing down his extreme muscular activity, by which he was using up his nerve energy too rapidly, horseback riding and simple feeding, with regulation of hours of sleep to eight in twenty-four, the physician is growing back to nervous health as rapidly as common-sense methods will allow.

The opposite is shown in the following:

CASE V.—W. B. H., aged 22. A young man of brain, a literary genius, and of but average physique, came to me a year ago suffering from headache, general restlessness of dream states, and a lassitude out of proportion to the cause for it. His eyes and all other organs were normal. The patient had no vicious habits. Since elimination proved this acquired irritability of the central nervous system to be due to lack of physical build and exercise largely, walking a half hour daily in the open air, light calisthenics, a free supply of proteid foodstuffs, and hot bathing to favor circulation in the skin, has wonderfully improved the man.

What fully promised to be a precocious nervous wreck twelve months ago is now, to use his words, "calm and composed." It is, with no exaggeration, a very important event that this young person is saved to do a great work in literature. The case has well repaid me in this thought alone, my best fee. The riddles of the nervous system are legion, but many can be solved, and scientifically.

CASE VI. I shall make a final word in briefly reporting the case of A. B., aged 19 years, seen in the practice of Dr. E. Pearce, of Steubenville, Ohio, August 20th, 1901.

Miss B. had evidently dreamed of burglars being in the house. She came to her father at night perfectly mute, and making signs of her fright by the marauders. She had no convulsion, and seemed quite composed in every way the next day, when there was found nothing wrong with the vocal or other organs. There was no motor palsy anywhere, but there did exist a segmental anesthesia of both arms to shoul-

ders. At the end of a week the patient suddenly began to talk, and in a few days speech became normal and the loss of sensation disappeared entirely.

It was proven that no burglars were in the house, but some of the girl's garments were seen out of the window, through which she persisted they had descended to the ground. The girl was truthful.

This case probably represents one of unconscious mental impression, as to the fact of a dream auto-suggestion for her throwing the clothing out of the window, and for the suggestion likewise of her aphonia, due, as she persisted, to one of the men having slid a rod down her throat and stating she "could not talk."

I have never seen such a case before, but it is valuable to force the conclusion of conscious and unconscious mind action, a point much disputed in recent years by psychologists, who could add much to their armamentarium of scientific facts by the advantage of practical studies at the bedside.

The point that brings this case into place in this contribution is that this woman shall be guarded against becoming a confirmed hysterical invalid by proper explanation of the case and thus clearing up the psychology of a rare condition spent on our patient.

Conclusions.—Many nervous and mental diseases have perverted function as a basis for development. The mental aspect must be recognized. Recognizing pathogenesis in this light and seeking early signs which are not now given sufficient attention by the profession (such as irritability of the motor and sensory nervous system—lassitude, forgetfulness, etc., in a person of intelligence who tells you in the history that such changes in his life do occur), we can hope by this scientific borderland study to tend for regeneration of many people who will ultimately go into some of the graver organic system diseases, when it can not be truly said "it is never too late to mend," to use words of the accurate novelist Charles Reade.

Short vacations, a trip on your beautiful lakes, or the quieting ocean voyage, canoeing, horseback riding, overfeeding with milk and plain, wholesome foods, good company to

aid digestion scientifically, if you please, music, bowling, golf, etc., all selected for the case in hand by careful somatic and mental study, will avail much in preventing general nervousness, the borderland of perhaps irreparable nervous and mental disease; and that nervous health can be thus acquired in those who do not know (but would wish to if they could learn its value) by carrying out such advice as is given in this paper.

A final word of appeal is made to you gentlemen to disseminate these practical facts among the laity.

DISCUSSION.

DR. F. P. NORBURY, Jacksonville, Ill.—Environment has much to do with the production of the condition referred to. It has been frequently noticed in schools for young women that if one young lady gets disturbed over approaching examinations others are apt to worry themselves into a belief that they also are going to have trouble. I have noticed this particularly in the departments devoted to music. In one class eight out of twelve approached their closing year with a great deal of anxiety, the result being that three of them had nervous breakdown before their graduation. Environment likewise applies to home life. I know of one case where there were four generations living together; representatives of each generation had an affection of a nervous type, which apparently had been transmitted and kept alive by suggestion. This applied particularly to a young man in the family who became a student in the law school at Ann Arbor. It was noticed that he did not have confidence in himself, and like others of his family became a neurasthenic largely through suggestion as to his inability to meet the conflicts and storms of life.

Dr. C. H. HUGHES, St. Louis, Mo.—I did not have the pleasure of hearing all the paper, and therefore I am not in a position to criticise it, but I would like to say generally that the first essential to the development of a neuro-pathological condition is an inherited tendency to be thus attacked. The second is the silent suggestion of environment, which may be in the family habits or peculiarities of association and surroundings, as you see in some historical characters in whom inherent habit traits and the influence of environment are

marked. The third is overstrain of the neural or psychoneural centers. If you have these three factors it is very difficult to escape nervous diseases. When you consider the strain of civilization on the human race you see how inherent aptitudes to take on nervous disorders are so common. It is doubtful if at the time of the French Revolution and soon after the French nation, as we look back at them from to-day, possessed many stable psychic nerve centers in Paris. In the brain of the average Frenchman these nerve centers were then absolutely unstable. The French Revolution and Napoleon Bonaparte made the whole French nation crazy or mentally unstable for a time, and the wonderful strength of the race is shown by the fact that Frenchmen are not now all crazy individually and demented. No other nation ever endured so much and so great political brain strain. Environment is the second essential factor in developing a neuropathological condition, and overstrain, as I have said, is the third. In the treatment of neuropathic diseases the important things are to remove the exciting causes, and these are to be found in the environment and in the overstrain.

DR. PEARCE (in closing).—It is evident that increased attention must be given to pathogenesis of nervous diseases to prevent what has been called "Americanitis," which has at the present day serious effect upon the community at large.

XI. THE NECESSITY OF AND INDICATIONS FOR THE BED TREATMENT OF THE INSANE.

BY FRANK PARSONS NORBURY, M. D.,
JACKSONVILLE, ILL.

The clinical inquiry into the mind diseased contemplates only the possibilities of giving relief from the thraldom of perverted reason. Clinical psychiatry has long since established the truth that we should approach the study of diseased mind through the routine and in accordance with the methods of practical medicine.

Etiology should then first concern us, for while we may regard mental disease in the great majority of cases as an evidence of degeneracy, yet frequently (I should say most

frequently) there exists some cause which hastens or provokes the appearance of insanity. If we can ascertain this cause, revoke its power in its incipiency, there is a possibility that we may avert insanity, invite evolutionary conditions destined to arouse sufficient latent potential energy to carry the individual over this period of stress. By so doing we give encouragement to the belief that we may frequently prevent insanity, at least for the present, and lay a permanent foundation for more wholesome mental life in the future. This is not an unwarranted assumption, even in the face of hospital statistics and the extra-scientific opinion which is too prevalent, that inherent conditions found in most cases of insanity predestines to a life of chronic mental invalidism.

Heredity, it is true, is the most powerful etiological factor in insanity, but it is a law which may work for the patient's good as well as paving the way to a life of woe. I like to look upon heredity as a law calculated to preserve the human species, which in its workings never fails to recognize the tendencies to reversion to the normal type and by gradations saves the good from the waste-pile that it may, if properly cared for and nurtured, become strong and useful elements in the evolution of a human life. There are, I admit, insuperable difficulties in the way of recognition of the degenerate tendencies, but in the study of disease it is our duty to solve the problem as we would disease in other parts of the body. The etiologic conditions are not unlike those producing disease elsewhere in the body, excepting perhaps in those forms of insanity having marked hereditary causes. These forms are (1) vesanic heredity, or the heredity of pure insanity of vesania; (2) cerebral, or congestive heredity, *i. e.*, the heredity of cerebral affections and general paralysis; (3) neurotic heredity, or that of the neuroses (Regis). Of these types only one (the first) seems to me to be without the border of possible relief from well-directed treatment, which indeed may alter the whole life-trend of the individual burdened with inherent conditions.

Internal medicine, I repeat, may, if carefully applied, start the tendencies up-hill instead of giving impetus to the downward course. For this reason every case of incipient insanity should be given great care and attention. My experience justifies me in asserting that insanity, excepting in the pure vesania type, responds readily to treatment. In order to institute early treatment we must have early recognition, and on the family physician depends the responsibility of this recognition and, too, the early treatment.

The family physician is invaluable in making a diagnosis in mental disease because of his familiarity with the health-history of the patient, his antecedents, and his general social condition, etc. The family physician is usually better able to give a more truthful, less exaggerated account of the patient than members of his own family. The important question too of heredity may be best approached through him, and with his assistance etiology may be investigated to a fairly satisfactory degree. After an examination of the patient and with the facts summarized, the special diagnosis of the case can then be made. The distinction as to classification may not be possible until after some time has elapsed, because prolonged observation is frequently necessary in order to make a complete diagnosis. Treatment in general should be commenced as soon as possible—delays are dangerous, and especially so in border-line cases. Too frequently tentative means of treatment are instituted, thus permitting that golden opportunity—the early days—to pass before well-directed and appropriate treatment is begun.

It is a mistake to regard mental disease as something that will pass away. It is a mistake to permit the patient to be in a great measure his own physician, going on in the circle of his daily life amid the conditions which have contributed to his dissolution and thus laying the foundation, and rapidly too, for a life of mental invalidism, or at least a delayed convalescence. The principal necessity at the very beginning of

most all cases of mental disease is to look upon their therapeutic needs just as we would any other disease occurring in the category of internal medicine.

The treatment then would be conducted in accordance with the principles of medicine and not by temporizing, inefficient, inadequate, almost foolish and cruel makeshifts of practice. What is to be done must be done quickly—the therapeutic measures must be promptly applied, having as a base the fact that the principal lesion in insanity is in the brain.

Insanity in its incipiency is a functional diminution in the activity of metabolism; "this is borne out by operation of the impoverished body, the attenuated action of nerve currents, the defective blood and other evidences showing a diminished, weakened, impaired bodily nutrition. Mental alteration is but the result of lowered nutrition of the brain, as the phenomena of conduct, of intellect, of will, and of consciousness itself, one and all are dependent upon a high degree of activity in the nerve elements." The adjustment then of mind to the material body must be studied along the lines of bodily nutrition. The premonitory stages of all acute insanity, excepting the true vesania type, show physical depression, impaired nutrition characterized by disturbed sleep, gastro-intestinal complications, loss of bodily weight, and tendency to exhaustion. The brain feels this exhaustion; the overfatigue, the toxic or traumatic influences, etc., impair the nutrition of the neurons, and there are consequent disturbances of brain-cell activity. Barker says "the dependence of the neurons upon nutrition influences is well shown in certain circulatory disturbances. When the nutrition of the brain falls below a certain minimum the mental capacities become clouded or may even vanish."

Morbid psychic conditions are overactivity, inhibited action, abolition, or destruction of function. Inasmuch as the morbid process of psychic dissolution is along the lines of disturbed or faulty nutrition, it is evident that in order to

counteract debility, conserve energy, and allay irritation our treatment must be based on a therapy which reverses the dissolution, restores function, prevents waste, and promotes resolution. Rest is the prime essential in such treatment, and gives to the exhausted cell the opportunity to renew energy which has been wasted by pathological conditions, by reason of which there is disturbed resistance, modified inhibitory influences, physico-chemical changes, perhaps not sufficient to produce anatomical or histological changes but yet sufficient to affect mental stability.

Rest given in a natural method and combined with the indications generally pronounced for the use of associated means of overcoming waste is sure of results where no organic disease of the brain exists. Weir Mitchell popularized the rest cure in the treatment of nervous diseases, and while the methods as systemized by him are simple, yet they are comprehensive and meet all of the requirements of therapeutic indications. His classic monographs, "Flesh and Blood," "Wear and Tear," should be read by all physicians as part of their training in the principles and practice of medicine. Rest has for many years, in a modified form, been one of the essentials of practice in mental disease, but we must insist that isolation in a hospital is not all there is to the rest treatment. Isolation is important, but that is only a feature of practice which every institution is supposed to offer. We must go further than this, and as Neisser (International Medical Congress, 1890) advocated, make it a broad and established system.

Rest is in a measure given to every patient by subjecting him to the discipline prevalent in all hospitals, but the more refined application of the principles of the rest cure can only be secured by following the special indications in each case. Rest must be given in bed and in accordance with the methods of Mitchell, keeping in mind the fact that while the hospital is in a sense a refuge, it more truly offers in its service an efficacious means toward the end of producing restoration of

reason. It is by following the routine of this therapeutic method that we prove every day that application of the rest cure is both scientific and humane. It is a precious therapeutic resource which has not been properly appreciated by the profession as yet, for if it received the consideration due it there would be less temporizing with inconvenient methods and systems and travel less, putting off the inevitable, and more attention given to treatment methodical and well directed and along lines destined to conserve energy rather than waste it.

Rest in bed is of the first importance, using restraint if necessary, then give wholesome food, nourishing food, in small quantities frequently repeated. Eggs, egg-nog, milk, milk punch should form the basis of diet, and later such vegetables and meats as will be easily assimilated. In cases of profound toxemia the diet may be predigested, such as panopepton, or liquid peptonoids, combined with alcoholic stimulation. Diet should stand next to rest in bed in the order of importance in the place of treatment. As a part of the dietary regulation perhaps may be included the use of drinking-water. Water should be given freely from the very start, as without elimination we can not expect to have assimilation. In fact, elimination must be promoted at once. I usually find that border-line cases are constipated, drink little water, have a scant urinary secretion, and present every evidence of disturbed elimination. It is a part of my routine of practice to examine the urine of every mental and nervous case, as it indicates the state of metabolism and aids in outlining treatment. The blood examination is perhaps of greater importance than the urinary analysis, and when it has become, as it surely will, a part of the hospital routine necessary in the diagnosis and treatment of mental disease, we will hope for more brilliant and scientific results from these institutions.

The laboratory has become an essential part of a physician's office, and it must be used if we expect to achieve intelli-

gent results in practice. It is necessary in the rest treatment to make daily observations according to laboratory methods in order to outline treatment. Treatment becomes easy when our diagnosis is established. Rest treatment is applicable in a wide range of cases, especially border-line cases of the neurasthenic type, where a prolonged rest of six weeks to three months will give highly satisfactory results. I have treated during this year in general hospitals a number of such cases, strictly following isolation, enforced rest, overfeeding, massage, electricity, etc. The objection I have to the general hospital is that, even where facilities are all that they need be, there still is that publicity which during the convalescent stages will not help the patient on his course, because he in a measure is looked upon as a little queer and those unintentional but nevertheless unkind things are said which to a sensitive person, as many of these cases are, hurt and cause distress.

I have used the rest treatment in cases of acute mania, restraint of course being necessary for a part of the time. I do not restrain them continuously, but at least for two days at the beginning they are in bed and then 18 hours or more a day for a week or more and then for 12 hours until their strength is sufficient to permit them to be up. Cases of acute mania represent, in spite of their apparent strength, not infrequently profound toxemia and exhaustion; their whole condition proclaims the using of energy, in fact the disease itself is perversion of energy, and the indications are to arrest it and bring it back into normal channels. Rest will do it when combined with proper medication and diet. Too frequently sedatives are heroically given in the treatment of mania, with the result that toxemia is promoted, secretions are locked up, and elimination, if it has existed, is brought to a standstill and danger follows. Acute delirium is too frequently treated this way; this condition, above all other acute psychoses, needs enforced rest, isolation, and quiet. Its mortality under the best of conditions is high, but the burden is increased by the lack of rest, of quiet, and of medication.

Rest, then, is essential in all acute psychoses. In melancholia the rest treatment is especially serviceable and the results very satisfactory. I use it more in accordance with the Weir Mitchell plan. I use rest in other forms of insanity also; in circular insanity it is serviceable during the whole course of the mental depression and part of the period of excitement. In epochal insanities, especially the insanities of adolescence, rest is of special service. I have used it with success in boys and girls just on the border of mental breakdown. The menopause calls for careful observation of patients, and for these cases I prefer the modified rest cure, especially in those neurotic individuals having profound manifestations of the angioneuroses. Elimination, overfeeding, and rest will give results here even when we feel discouraged as to the outlook of the case. Insanities of other forms, such as alcoholic, following drug habits and toxic insanities, post-febrile, and with constitutional or other disease, such as diabetes, Bright's disease, heart affections, etc., rest is indicated and is serviceable associated with other methods of therapeutics.

DISCUSSION.

DR. J. B. LEARNED, Northampton, Mass.—If we only knew more about the pathology of diseases! If we knew how the Almighty would build a perfect body and then how that body could be preserved in a normal state, we should be in a better position to advise our fellows. The best thing for us to do, with a view to gaining this knowledge, is to study animals in their natural state and see how they live before they become subject to the habits of domestic life and the conditions of civilization. Perhaps the result would be to show us that living under normal laws they remained a natural lifetime—always of course barring starvation and violence. That is to say, with the exceptions indicated, they all went out by the old-age exit. Now, it seems to me that in cases like those mentioned, where boys about to graduate have broken down from over-mental strain, instead of giving them rest, the care of a physician, and drugs it would be vastly better to follow the plan of the Almighty and let

them out into the fields and the woods and taking their fishing-rod or gun with them live as far as possible according to a state of nature. Let them eat natural foods, live in the open air, and get physically tired out so as to secure rest and sleep without the aid of hypnotics. I have no doubt a similar course might be pursued with advantage in the case of patients suffering from incipient insanity, the only difference being that they would require to be kept under proper supervision. This, it appears to me, would be the way of the Almighty in the treatment of cases of the kind, and I think we might do well to follow it. No artificial modes of living have proven equal to Nature's in the development or preservation of animal bodies.

DR. C. B. BURR, Flint, Mich.—In the early days of my hospital work it was our practice to place cases of acute delirious mania in bed. Unfortunately, several patients one after another given bed treatment slipped through our fingers and the treatment was discredited. I remember hearing one of the staff, laboring under great discouragement, make the remark that it was equivalent to signing the death-warrant of such patients to put them in bed. Nowadays I invariably treat patients of this character by this method, and regard it of the utmost importance to do so. It is to my mind plainly self-evident why better success is obtained by bed treatment at present than in former times. Our therapeutic resources are greater and nursing attention is more intelligently bestowed. We employ now those aids to treatment which the development of trained nursing has brought about, massage, electrotherapy, and the like. We employ intestinal antisepsis and use medicines with greater discrimination. Patients suffering from acute mania with confusion are given supporting treatment, heart tonics, particularly strychnine, are kept quiet, have the ice-cap applied to the head, and every effort is made to prevent waste of nervous force. The result is that the majority of these cases get well. I am thoroughly in harmony with the views expressed in the paper.

DR. A. E. STERNE, Indianapolis, Ind.—I also endorse Dr. Norbury's position. I think it would be a dangerous thing to adopt the advice of one of the speakers and give these invalids a gun and let them roam around the woods at their own sweet will. The proper place for such patients is in bed. They may look strong and healthy, but it will be found on examination that they are really run down and weak. You might as well expect a watch with a weak mainspring to keep correct time as to expect these young men to go on with their studies, until they have had rest and treatment and had

their systems built up. The physical condition is bound to come down where the mental condition is weak. The two things always go hand-in-hand. Therefore I want to support the position of the essayist that patients of the kind described always require rest and treatment, and that the treatment can not begin too soon.

DR. NORBURY (in closing).—My experience with boys and girls mentally afflicted is that you can not get them to go to the woods like other boys and girls. They can not enjoy themselves even if you are able to get them away from home and into the woods. They are not satisfied with that kind of life. They want a life of nervous excitement, which in the light of subsequent history is a sure premonitory symptom of a mental breakdown. Again, it is often necessary to use forcible means to restrain them at home until they can be cared for elsewhere. This past summer a boy convalescent from adolescent insanity, who had been under my care, was taken North in the lake region, where it was with the utmost difficulty he was restrained. I always hesitate to allow boys and girls in that condition too much liberty.

XII. HEMATOLOGY.

BY L. H. WARNER, M. D.,
NEW YORK CITY.

With the beginning of the new century we have entered upon the brink of a new era in medicine and surgery. For his oration on surgery, before the fifty-second annual meeting of the American Medical Association at St. Paul, Minn., June, 1901, Dr. John A. Wyeth, of New York, selected the subject entitled "The Value of Clinical Microscopy, Bacteriology, and Chemistry in Surgical Practice," and well may I add: in medical practice. The address is the master-work by a master of our profession. Having selected the subject of "Hematology" for my address, I desire to preface same with a few of the remarks of Dr. Wyeth (see *Boston Medical and Surgical Journal*, June 6, 1901, page 546). To-day the blood is one of the most attractive subjects of laboratory research work, and although hematology is practically in its infancy, many valuable discoveries have already been made,

and in the *proper* study of a patient, a knowledge of the blood is as essential as that of the urine. (*Verite sans peur.*) A knowledge of hematology enables the surgeon to detect any form of anemia and to determine whether it is a type of blood impoverishment which can be corrected, or whether it is of the graver or more pernicious forms, which would either preclude an operation, or, if this were absolutely necessary, would enable him to announce to those entitled to information the gravity of the outlook, and here I am forced to extend the doctor's remarks by stating: A knowledge of hematology is of the greatest value, in fact necessity, to the general practitioner, especially the general practitioner in smaller cities, where no access to laboratories may be had. Had Dr. Wyeth's address been other than one confined to the surgical section, I believe his closing remarks would have been: Science and art of medicine are inseparable. ("*Vox aubita perit, littera scripta manet.*")

We must admit that every advance in science provides a fresh platform from which a new start can be made, that the human intellect is still in process of evolution, and that the power of application and of concentration of thought for the elucidation of scientific problems is by no means exhausted. Scientific knowledge is no hereditary gift, but a tactful, hard-earned acquisition. To become a skilled surgeon requires years of hard study and labor about the dissecting and operating room; to become a skilled physician, years of work and study and observation in clinics, hospitals, and laboratories; to become a skilled hematologist requires years of constant study, observation, and experimentation in chemical, biological, physiological, and bacteriological laboratories and at post-mortem dissections. Amongst the laboratory workers exists a natural condition to maintain and increase the reputation of the branch of knowledge which he or she cultivates, and it is not infrequent that we hear that one of the students of the rank and file has made some discovery which nullifies the teachings of his professors. (*Fas est et ab parvum ingenium doceri.*)

The study of hematology is divided into three branches:

1st. Methods of clinical examination of the blood.

2d. Physiology of the blood.

3d. General pathology of the blood.

And I shall dwell upon these branches by mentioning: 1st. The imperfect practical manipulations now in use. 2d. The effect of medication upon the blood. 3d. The blood in infectious diseases.

The scientific apparatus and appliances adapted and necessary for blood work are many, but the principally used ones are: A good microscope with 1-6 and 1-12 oil immersion lens, a Fleischl hemometer and blood needle, hot stage, staining solutions, cover-glasses and slides, small hot oven, etc.

But one American author, Dr. R. C. Cabot, of Boston, has furnished us with a text-book entirely devoted to the clinical examination of the blood, a brilliant work by a thorough student and teacher. ("*Fama semper vivat.*")

Among the European authors we find such savants as Von Ehrlich, Engel, Ziemann, Von Limbeck, etc., and they all agree upon the following methods of obtaining a specimen of blood for microscopical examination:

1. Obtain the blood by puncture.
2. Spreading of blood.
3. Diluting of blood for counting purposes.
4. Counting of red and white blood cells separately.
5. Estimation of hemoglobin.
6. Estimation of specific gravity.
7. Preparation of cover-glass specimen.
8. Staining of specimen.
9. Differential counting.
10. Bacteriological examination.

Regarding the obtaining of blood by puncture we are taught as follows: Clean the lobe of ear or bear of finger of patient with a damp cloth, and then rub with a dry one, so as to remove all gross dirt (some authorities advise washing the part with soap and water, alcohol, or some antiseptic solu-

tion), and use a lancet or surgical needle for puncturing the skin. My findings, based upon numerous tests, reveal the fact that blood obtained in this manner will always show certain histological changes in the cells, which are not shown in the blood of the same person if the blood is obtained by a method which I have adopted in my regular work after many years of practical and experimental work in the field of hematology. ("*Facile est inventi addere.*")

Friction produced by rubbing the part from which the blood is to be obtained will cause temporary thermogenesis, and consequently a temporary invasion of leucocytes in the blood vessels near the irritated part. Cleaning the parts with antiseptic solutions or soap and water will cause the immediate resorption of some of the chemical substances of such antiseptic or soap into the nearby tissues, and will cause first chemio-physiological, and subsequently histological changes in the blood cells. I prefer obtaining the blood from the bear of the finger. I have the patient immerse his or her hand in lukewarm water for a few seconds, and permit the hand to dry by ordinary temperature. Should your patient see you exhibit a lancet or surgical needle he or she would at once be overcome with fright, lest the procedure might hurt. The very fact of an existence of or appearance of fright will cause an instantaneous mild form of leucocytosis due to shock, sufficiently so as to materially alter the blood picture and as to lead to a possible incorrect diagnosis. I use a needle resembling a miniature scarificator, known as a blood needle, and which can be procured from any surgical instrument maker. This miniature instrument can easily be hidden in the palm of the hand; the needle can be regulated as to the depth of puncture desired; the puncture occurs instantaneously and causes a sufficient exudation of blood to make all the tests necessary for a complete blood examination, without exciting the patient to even the least degree. The two different methods of procedure, although apparently of little note, are of the utmost value in arriving at a

correct diagnosis by means of blood examinations. Our text-books quote correctly regarding the spreading of the blood. Wipe away the first few drops, and by smearing same around the puncture you will avoid having any dirt mixed with the blood. Whenever this last rule is followed there is absolutely no need to wash the parts prior to puncturing for the blood. Collect the fourth or fifth drop upon a perfectly clean cover-glass, without allowing the latter to touch the the skin. Drop the cover-glass face downward upon a perfectly cleaned glass side, so that the force of the impact will help to spread the drop of blood. Place slide immediately under the microscope, using the one-twelfth oil immersion lens and examine. Whenever a lengthy study of the fresh blood is required, then the hot stage should be brought into requisition. The process of diluting the blood is universally the same, differing only as to the solutions to be used. For red cells a one per cent. solution of sodium chloride is my preference. Water alone breaks up the red cells, but chloride of sodium preserves them. For white cells a one-third of one per cent. solution of acetic acid with one drop of saturated watery solution of methylene blue, 1 in 100, is my preference. To get exact results and so as to save a great deal of time and labor, the Zeiss-Thoma counting apparatus with separate pipettes for red and white corpuscles should be used. The method of counting is too thoroughly explained in all text-books to deserve any further notice at this time. For the estimation of hemoglobin the Fleischl hemometer, or the Gower's hemometer, are mostly used, the use of which is thoroughly explained in all text-books. For the estimation of the specific gravity of the blood, Hammerschlag's method is mostly used and seems to work best. There exists no fixed rule regarding the preparation of cover-glass specimen, but as a rule we are taught as follows:

Arrange a number of clean cover-glasses near bedside of patient and obtain the blood as previously stated. Collect

a drop of blood upon a cover-glass, and let the latter fall upon another cover-glass in such a way that their corners do not coincide. The drop of blood will immediately spread upon and over the whole surface, and as soon as it stops spreading slide off the top cover without lifting them apart. Dry the cover-glasses over an alcohol flame, or immerse for half an hour in a solution of equal parts of ether and alcohol. ("*Audi alteram partem.*")

Experimental work has taught me that the above teaching regarding the preparation of cover-glass specimen will lead to grave errors. Measurements of the corpuscles of the fresh blood and those of corpuscles prepared by above method will show material differences, and, therefore, expert testimony regarding blood examinations, especially relative to corpuscle measurements, would be of no value if wanted in any court of law, on account of the contradicting testimony which would be the natural results of such differentiations. The heating of blood specimen over an alcohol flame will cause the coagulation of the serum albumen of the blood plasura, and the placing of the fresh blood in alcohol and ether will cause a shrinkage of the red corpuscles, and at the same time the dissolving of part of the nuclein within the nucleus of the leucocytes. Both ether and alcohol are solvents of nuclein. After obtaining my blood specimen and sliding apart the cover slips I place the specimen under petri cover-glasses, and allow them to dry. This requires but a few moments, after which I place cover-glasses and all in a hot oven regulated at 98° Fahr. for twenty-four hours. The measurement of blood corpuscles in blood specimen prepared in this manner corresponds at all times with the measurement of the fresh specimen. The nuclei in the leucocytes in blood specimen from the same patient, but prepared differently, according to the two methods previously cited, exhibit a great difference in staining affinity.

The method of staining, differential counting, and bacteriological examination of the blood are ably presented in

all text-books, but the value of such work in aiding toward finding of diagnosis depend, at least in my opinion, not alone upon a good reliable stain, but more so upon the processes employed in obtaining the blood and the preparation of cover-glass specimen. Of the stains which are of best value in blood work, I mention the Ziemann-Romanowsky eosin and methylene blue stain. Only by years of patient study and research work have I been able to find the above differential methods, and I am content to know that "*la patience est amere, mais son fruit est doux.*"

Diet, hygienic surroundings, medication must be considered when studying the histological changes in the blood, especially should we pay attention to results obtained after the administration of the halogen derivatives, of mercury, and of iron. Organic chemistry has supplied us with the active principles of the vegetable organism, and of late supplies us with numerous active principles of animal tissues and serums. Heretofore the physiologist has furnished us with data regarding the physiological action of our therapeutic agents, such data being based upon research work in the department of physiological chemistry and biology; but to-day we realize that the blood is the real indicator as to the physiological action of any drug or food taken. The principles and problems of human physiology comprise nutrition and the functions of the muscular and nervous system. Human physiology as a science is still very imperfect and slow in its progress, and can not be compared in exactness with the sciences of chemistry, hematology, and physics. Physiological experiments are based upon observational and experimental methods, amongst the former of which the study of the histological changes of the blood cells is of the utmost value. Lichtenstein, Kunkel, and other investigators claim that change from a poor to a nourishing diet causes a gradual increase of hemoglobin. This fact is now daily corroborated. Other investigators claim that the addition of iron salts to food increases the amount of both

red cells and hemoglobin, all of which claims are based upon research work along hematological lines. The physiological function of the red blood corpuscles is the absorption of oxygen in the lungs and its transportation to the tissues. They are the oxygen distributors of the organism.

The function of the leucocytes has been the subject for a great many investigations, but we have no positive information as to the normal function of these cells in the body. The histological structure of the leucocytes differs considerably, and it is presumed that their function is as diverse as their morphology. Various functions have been attributed to leucocytes, such as their protecting the body from pathogenic bacteria, or by forming defensive proteids which destroy the bacteria (Metchnikoff's phagocytosis theory), and their aiding in absorbing fat and peptones from the intestines. It is known as a fact that all peptones are attacked by the leucocytes by means of osmotic process, the basis of all physical action in the organism, and mingling with the blastema of the leucocytes they become suffused with a certain molecular activity, imparted to them through the influence of the nucleus, creating vitalized pabulum, which in turn is appropriated by the individual tissue cells of the organism as it passes through the capillaries. Sufficient research work has been done to enable us to classify the various forms of leucocytes by their histological structure and to determine their functional capacity. We are able to distinguish the different leucocytoses, whether physiological, pathological, due to medication or other causes. Physiological leucocytosis comprises leucocytosis of pregnancy and of the newborn, and digestive leucocytosis. Pathological leucocytosis comprises leucocytosis due to inflammatory processes, to tumors or malignant growths, post-hemorrhagic and premortal leucocytosis. Leucocytosis may also be caused through irrational diet or medication or non-hygienic surroundings. Wherever we meet with a leucocytosis we find an increased activity of thermolytic or thermogenic processes, and

this leads me to consider the blood of cases accompanied by abnormal temperature. All diseases are accompanied by either one or all of the changes in the blood. Decrease in hemoglobin or red cells, or both, frequently histological changes of the latter, increase and histological change of the leucocytes. The larger the amount of polynuclear leucocytes the larger becomes the amount of phosphates eliminated in the urine, often accompanied by traces of nucleo-albumen, both indicating tissue destruction.

Our text-books of physiology relative to the chemistry of digestion and nutrition state: The object of digestion is to convert the insoluble and non-dialyzable proteids into diffusible soluble peptones, and they are absorbed mainly, if not entirely, as proteoses and peptones. They pass immediately into the blood, nevertheless examination of the blood immediately after eating, while the process of absorption is in full activity, fails to show any peptones or proteoses in the blood. In fact, if these substances are directly injected into the blood they behave as foreign and even as toxic bodies. These latter statements do not coincide with the findings previously reported, viz., that the leucocytes aid in absorbing peptones from the intestines and attack these by osmotic process, converting them into vitalized pabulum. If peptones as such are injected into the blood they become unfit for the use of the tissues, and are eliminated by the kidneys. Albuminoids and fats after conversion by physiochemic processes are absorbed like the proteids. The carbohydrates are absorbed in the form of sugar, or sugar and dextrine into maltose, or maltose and dextrine. Water and inorganic salts act as food, as they serve to replace the continual loss of these substances in the various excreta. With these facts before us, we are able to positively determine through blood and urine examinations the amount of food resorbed. In a like manner can we determine the physiological action of drugs. If we speak of chemical or physiological incompatibilities in our text-books of materia medica,

caused by chemical decomposition with the production of a compound, or by the compounding of drugs having dissimilar effects, does it not appear rational to likewise investigate whether such incompatibilities occur in the laboratory of the human organism, after the administration of one or more drugs, and again is our present knowledge of such chemio-physico changes or reactions based upon a sound understanding? What becomes of ferrum, one of the proximate principles of the human organism, and which is playing such an important part in the red blood corpuscle and the nutrition of the body? Iron appears in the blood as hemoglobin, hence we estimate the physiological action and therapeutic effect in cases where ferrum medication is indicated by the increase of hemoglobin and red corpuscles.

Glancing at the chemical analysis of human blood in its entirety, we find it to consist of (per 1000 parts):

Water, ... 770–320 per mille.,
Solids, ... 180–230 per mille.;

the latter consisting of:

Organic solids, ... 173–320 per mille.,
Inorganic solids, ... 6– 10 per mille.

The inorganic ingredients, aside of 6-12 per mille. of extractions, consist of albumen and hemoglobin. Most of the iron salts exercise an astringent effect and cause constipation and headache, the phosphate and pyrophosphate being exceptions, but all iron preparations aid in blood formation. According to Bunge all ferric salts are reduced to ferrous salts by the action of sulphuretted hydrogen or alkaline sulphide. His experimentations as to the amount of iron absorption lead to the finding that inorganic iron is converted into sulphides, while the nucleo-albuminous irons are readily absorbed. Salkowsky (*Centralblatt f. medicinische Wissenschaften*, 1900, No. 51) subsequently reports of a combination of a phosphoric acid base obtained from casein and iron. He noticed that during peptic digestion of cow's milk casein a great part of the organic phosphorus dissolved.

He then proceeded to prove that the dissolved phosphorus was an ingredient, or rather one of the split products of paranucleinic acid, which could be extracted with ferrum oxydum hydratum. The resulting iron combination contained 9 per cent. of nitrogen, 2.5 per cent. phosphorus, and 22 per cent. iron. This iron combination is easily dissolved in a weak solution of soda bicarbonatum, insoluble in acidum hydrochloricum dilutum of a concentration corresponding to human stomach juice. From a physiological standpoint this iron combination is of importance, because after internal administration it causes a strong augmentation of iron in the organism, especially the liver, and its administration causes no ill effects. This triple iron compound, "ferrum paranucleinicum," also known as "triferrin," appears the rationale of iron therapy. Comparative clinical tests verify the above statements. Not alone does a rapid increase of hemoglobin and red corpuscles follow the administration of triferrin, but also the polynuclear leucocytes become less in number, and are replaced by young lymphocytes. As an explanation for the latter fact, Metchnikoff, Bunge, and I point to the physiological action of nuclein and its by-products.

Special attention should be given to blood examinations in all infectious diseases, especially to comparative study. Not alone are we able to arrive at an early diagnosis of typhoid fever by means of the Widal test, but also by hemoglobin estimation and corpuscle count. Septicemia is easily diagnosed by the finding of micro-organisms in the blood. Perfect staining methods are required to accomplish these latter results. Much attention has been directed to the study of the blood in syphilis, and the data thus far collected have not enabled us to arrive at a universal understanding. Lustgarten claims to have found a bacillus in the diseased areas lying between and within the pus cells, and also in the blood. Eve and Lingard have found a bacillus answering the description of the Lustgarten bacillus in the nucleated cells of the discharge from primary lesions and in tertiary gummata, while Alvarez and Tavel claim that this identical

bacillus is found in normal secretions. At all events, all efforts of cultivating said bacillus have been negative. Thus the theory that syphilis is a disease produced by pathogenic bacteria has as yet no reasonable support. Although I have vainly searched for the Lustgarten bacillus, following the author's preparing and staining methods, I have been unable to detect any such bacillus, but I have observed the smegma bacillus, whose morphological structure is exactly the same as that of the Lustgarten bacillus. While research work in this direction has been continued for a great length of time, little, if any, attention has been directed toward the comparative study of normal blood, blood of syphilis, and the blood of other infectious diseases. During the last year I examined the blood of hundreds of cases of syphilis, making hemoglobin estimation, counting red and white corpuscles and pathological differential counts.

During these studies I was frequently requested by some of the surgeons of the New York Skin and Cancer Hospital to examine the blood in cases of carcinoma, which gave me ample opportunities for comparative study. I examined the blood of syphilitic patients who had been under treatment for months and years, and new cases which had never been treated. The fresh blood of syphilitics always showed one or more (usually three) crenated red blood corpuscles with ameboid movement. If one of the crenated corpuscles came in contact with a healthy appearing corpuscle, then the latter would gradually undergo histological changes, finally appearing as a crenated corpuscle. The latter histological changes can only be observed if the blood specimen is kept at normal temperature by aid of the hot stage. I found the Justus hemoglobin test to be correct, but of no special value for early diagnostic purposes.

The fact that there exists a wide difference between the amount of decrease of hemoglobin as compared with that of the red corpuscles in all syphilitic blood should be sufficient reason to cause a change of the at present misapplied term of anemia of syphilis to that of syphilitic chlorosis.

While examining the blood of carcinoma cases I noted the same peculiarities which I found in syphilitic blood, namely, the crenated red corpuscles with ameboid movement. Specimens of syphilitic blood, or blood from carcinoma cases, when stained showed a corresponding number of nucleated cells to the number of crenated cells observed in the fresh specimen. The finding of these identical histological changes in the blood both of carcinoma and syphilis proved a new impetus to following investigations on original lines.

There still exists as much doubt regarding the etiology of cancer as of syphilis, although some excellent work is now being done in this direction, especially by Dr. Gaylord, of the New York State Pathological Laboratory. Gaylord is of the opinion, as lately published, that carcinoma was caused by a protozoon, which assertion still lacks confirmation. Accidentally I was requested to examine the blood of a young medical student, who was desirous of having his blood examined for no other purpose than curiosity. The results showed the blood to be normal. Hemoglobin, 89 per cent.; red cells, 4,700,000; white cells, 5500. On the day following this examination the young student was vaccinated, a suspected smallpox case having been reported in his boarding-house, and I saw him two hours after being vaccinated. Curiosity now prompted me to ask for a specimen of his blood, so as to learn what effect vaccination might have upon the blood. Results: Hemoglobin, 67 per cent.; red cells, 4,550,000; white cells, 8700. (The typical picture of syphilitic chlorosis in primary syphilis.) Microscopically examined the blood showed the same histological changes, both in the fresh and stained specimen, as were observed in the blood of cases of carcinoma and syphilis. I have subsequently examined the blood in a large number of cases before and after vaccination with the same results. Although I have examined the blood in all other diseases known, I have never noted such absolute comparative results as were observed in the blood of cases of carcinoma, syphilis, and vaccination.

XIII. ANEMIAS SECONDARY TO GASTRO-INTESTINAL DISEASE, WITH REPORT OF TWO CASES.

By G. W. McCASKEY, A. M., M. D.,
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The complex relationship and function of the blood stamps it as a tissue unique in the animal economy. As the common carrier of the body it is compelled to transport every molecule which passes to and from the tissues, into and out of the organism. It is thus subjected to widely varying influences of both a physiologic and pathologic character to an extent equaled by no other tissue of the body. It is enabled to maintain the integrity of its function and a distinct autonomy by what may not inaptly be termed its own inherent elasticity of structure. Its cellular elements may be reduced in number under pathologic conditions to 25 per cent. or less of its physiologic standard, and yet perfect recovery be possible. Their most important chemical constituent—hemoglobin—may be reduced in each individual cell to a similar degree, with the same possibilities of restoration to the condition of perfect health.

Among the most important factors influencing the function and structure of the blood may be mentioned the digestive organs, with their widely varying conditions of health and disease. The integrity of the blood, as of every other organ of the body, is of course obviously dependent upon the function of the digestive organs. The theory that numerous blood diseases and especially the anemias are frequently the direct or indirect result of morbid conditions of these organs has been formulated many times, in many forms, and substantiated by a large amount of clinical evidence. Facts of an experimental character bearing upon these questions are exceedingly difficult to procure for many reasons, a few of which I will endeavor to point out.

In the first place, everything indicates that the search for a specific organism, the metabolic products of which would produce anemia with the same constancy that the organisms of diphtheria, syphilis, etc., produce their characteristic results, will be quite as futile in the future as it has been in the past.

The conclusion seems at present justifiable that such hematolytic effects as may result from bacterial processes are to a large extent the common result of varied and indifferent toxins, using this term in its broadest sense, although some may of course be more active in this direction than others. The results will further depend upon the vulnerability of the blood itself, as well as of the blood-making organs, to the morbific influences of varied character under discussion. This vulnerability will not only vary widely in different individuals, but in the same individual at different times. In this respect it constitutes no exceptional phenomenon in pathology. That the etiologic factors of disease may be active or otherwise according to that unknown and undefinable factor which we are pleased to term the resistive power of the organism, is a fact so well known as to scarcely need mention. Thus it happens under many conditions that a cause which has been existent for years will suddenly, owing to some change in environment or internal conditions, produce results of a most striking character. That such phenomena occur in the blood is a fact which has been abundantly illustrated in my own clinical observation and is in fact shown by the cases which will be later reported. With regard more especially to the action on the blood of poisons formed in the gastro-intestinal canal, there are many conditions by which they may be modified aside from the direct vulnerability of the blood itself. The epithelium of the intestinal canal and the entire structure of the liver stand as important intermediate laboratories between the gastro-intestinal contents and the blood. The ordinary peptones of digestion, for instance, are toxic if introduced

directly into the blood, but are so modified by the epithelial structures above referred to and by the liver as to lose their toxic properties and be assimilable by the organism. The observations of Kottnitz[1] on the gastro-intestinal mucosa in cases of leukemia sustain this proposition.

So far as the direct action of poisons upon the blood is concerned, clinical observations of an explicit and demonstrable character are not entirely lacking. Ehrlich, for instance, says explicitly that the resistance of blood cells as tested by the action of dilute salt solution and electric discharges from Leyden jars, etc., is lowered after many intoxications. The degree of virulence which will be manifested by gastro-intestinal toxins when they find their way into the circulating fluid will be obviously dependent, first, upon the degree of virulence of the micro-organism itself, which for the same species varies greatly at different times, and, secondly, upon the integrity and functional activity of the defensive mechanism above referred to, which nature has placed as a barrier for the protection of the blood, and of course all the organs which it supplies. It may thus happen that the colon bacillus, which is constantly present in health in the large intestine, may under modified conditions become exceedingly virulent, and its action upon the blood and other tissues suddenly become of a severely toxic character. Such a change has in fact been experimentally demonstrated to take place with this particular organism. Finally, I wish to call attention to a fact that I do not remember seeing emphasized, viz., that some agents, such as potassium chlorate, which produces a leucocytosis, also produces destructive changes upon the erythrocytes in the circulating fluid. I have found moderate leucocytosis in a large proportion of the cases of intestinal toxemia wherever the reaction to the organism was sufficiently strong to produce it, and I believe that there is good reason for assuming a hematolytic action upon the erythrocytes under many or most of the conditions which produce a leucocytosis. Of course this

[1] Ewing: Pathology of the Blood, 1901, p. 201.

does not exclude the possible hematolytic action of certain toxins, such as those of tuberculosis, which do not produce a leucocytosis.

In this connection the recent experimental and clinical observations of White and Pepper on the granular degeneration of the erythrocytes produced by lead are exceedingly suggestive as to possibilities of chemical poisons acting upon the erythrocytes. I have frequently observed the granular changes which they describe, but have regarded them as artefacts, due possibly to errors in technique, although the technique was apparently uniform. It seems reasonably certain that there are other structural changes in the erythrocytes which are not demonstrable by present methods of research, produced by a variety of chemical agents circulating in the blood. The resistive power of the red cell to different dilutions of normal saline solutions, as well as its varied resistance to other destructive agents—such as the shock from a Leyden jar, etc.—can only be due to variations in the construction of the cell, the nature of which can not at present be determined. The recent studies of Ehrlich and Morgenroth, an excellent summary of which has recently appeared in Meltzer's article, also point to the same conclusion. The hematolytic actions of certain alien serums is a remarkable phenomenon, and points to the probability of there being many chemical agents which may find their way into the blood as factors in lowering the resistive power of the red cells, and leading to premature senescence and decay.

The following cases are briefly outlined as furnishing clinical evidence in support of the views already set forth:

CASE I.—I. D. M. M., aged 62. A patient of Dr. Wright, of Convoy, Ohio, consulted me June 11, 1901, complaining of extreme weakness, loss of appetite, pain in back, palpitation of the heart, dyspnea, and disturbance of stomach function.

The stomach symptoms were of long duration, his health having been somewhat impaired in this respect for a number of years.

Three months before my examination he began to rapidly run down in strength, until within a few weeks the exhaustion had become extreme. It was progressive up to the time of his visit to my office.

The blood examination showed 1,500,000 red cells, 4,300 white, 30 per cent. of hemoglobin.

Examination of the urine gave the following result: Total quantity per 24 hours, 950 c. c.; sp. gr. 1022; total solids, 25.63; urea 2 per cent., or 19 grams; indican and skatol both present in moderate amounts; no albumen or sugar.

Stomach examination, Ewald test breakfast, removed in one hour, gave the following results: Total quantity, 20 c. c.; no free hydrochloric acid; total acidity, 85.

Lactic acid present in considerable quantities. Starch digestion good. Biuret reaction faint. The fasting stomach contained large quantities of cellular debris. There was also a severe colitis, evidently chronic in character.

Physical examination revealed a somewhat large and indurated liver, heart normal in size but with a mitral systolic bruit.

Examination of the dried and stained blood films showed the red cells to be of normal size, with very few normoblasts and no megaloblasts. There was a very severe poikilocytosis, the cells assuming all sizes and shapes. Measurement of less than one hundred cells gave less than the normal average.

The case was regarded as one of secondary anemia, probably resulting from disease of the digestive tract, and treatment instituted accordingly. He was placed upon Fowler's solution, with bitter tonics, and a five grain dose of double citrate of iron and quinine three times a day. This was not materially different from previous treatment. In addition he was given local stomach treatment every day, consisting of lavage, pneumatic gymnastics according to the method of Turck, and electricity. He was also given colon lavage for the colitis, and general hydrotherapeutic measures, particularly in the form of hot and cold douches.

Improvement was manifested in a week, the red cell count and hemoglobin showing progressive improvement from this time on, until August 7th, less than two months from my first examination, when the red cells numbered 5,000,000 and the hemoglobin 100 per cent. The patient's general condition was also very good, and he was discharged cured, with the exception of the gastritis, which was greatly improved, but not well.

CASE II.—A. B. V., referred by Dr. S. E. Mentzer, Monroeville, Ind.; farmer, aged 31, complains of stomach and bowel trouble of about five years' duration. Health always good until that time. He once had an attack of bloody flux, and since then has had occasional bloody stools. After a couple of years began to have stomach symptoms, and for the last two years his health has been in bad condition. Shortly after eating has abdominal distress, followed by thin watery movements mixed with particles of unchanged food. Has lost forty pounds in weight. His limbs were covered with purpuric spots in varying grades of intensity, some deep purple and others much faded, from the size of a silver dollar up to the size of one's hand. For two weeks before examination has had extreme dyspnea on slight exertion.

Physical examination shows enlarged spleen, liver, and heart, with systolic bruit, most marked over the apex.

Blood examination showed 1,700,000 red cells, hemoglobin about 25 per cent.

Examination of the urine: Total quantity, 250 c. c.; sp. gr. 1030; total solids, 24.36; urea 4 per cent., or 14 grams; skatol and phenol in abundance, but no indican and no albumen or sugar.

A somewhat similar line of treatment, modified with special reference to the altered pathological conditions of the intestines, was instituted. The patient was unable to leave his room in the hospital, the exhaustion was so extreme.

Improvement was very slow in appearing in this case, although an increase in the red blood cells and hemoglobin was manifested after a week or ten days. After this time improvement was progressive, and in three and a half months from the time treatment was instituted he was discharged with the anemia cured, the red cell count having reached 5,000,000 and the hemoglobin 100 per cent. The chronic gastro-intestinal disease was much improved, and the general physical condition very satisfactory, the patient being able to do light work on his farm. Is still continuing treatment for the gastro-enteritis under the care of his family physician.

So far as one can judge from the histo-chemical pathology of the blood these cases were certainly secondary anemias, and whatever view may be taken of the precise pathological processes involved, facts, the previous history of the cases, and the therapeutic test appear to establish the etiologic role of the gastro-intestinal disease. This is the

practical clinical fact, and in attempting its explanation we may freely admit the debatable character of the ground upon which we stand. Indeed, it seems to me that to insist upon any single factor as playing an exclusive role is to take too narrow a view of the situation. We should, for instance, recognize first the importance of the varying grades of sub-nutrition encountered; second, the chemical factor, the precise nature of which can not usually be determined, but the existence of which, as a factor in morbid hemoglobin, is substantiated by a mass of clinical and experimental evidence quite conclusive in character, and includes, in its broader relations, not only the products of digestion unmodified by the physiological functions of entero-hepatic structures and bacterial ptomaines, but the leucomaines of normal or morbid metabolism and the products of bacterial growth on all mucous surfaces or parenchymatous structures; and last, but perhaps not least, because of its greater permanence, that intangible something, the expression of a hereditary or acquired vice, which determines what I have termed the vulnerability of the tissue or organ. Such it appears to me is the broad view which clinical medicine should take of these cases; and in calling attention to the role of gastro-enteric disease, with a report of a couple of selected cases, I would especially emphasize the importance of not losing sight of the other factors to which attention has been called.

XIV. AUTO-INTOXICATION AND ITS TREATMENT.

By CHAS. H. SHEPARD, M. D.,
Brooklyn, N. Y.

Inasmuch as the body is a unit, made up of an aggregation of microscopic individual cells, with separate lives working co-ordinately in their union for the maintenance of the whole, the importance of the normal harmonious action of each one is readily perceived, for these cells, including those floating in the plasma of the blood and the lymph, are not mere particles of matter. They have a framework and their constituting chemical elements include substances among which some are actually poisonous, and their function in health or disease may produce toxic elements.

Health is the normal or harmonious action of all the cells of the body, and disease is but the effort of this body to resist or expel any intruder, of whatever nature, and regain its normal condition. This is plainly shown when a part is injured. The phagocytes accumulate in the form of an inflammation and continue until restoration is accomplished. When there is offensive material taken up by the blood, the liver does what it can to detain toxic elements and discharge them into the intestines, and the kidneys are most active in eliminating urea and other poisons. At the same time the action of the lungs is most important, and that of the skin still more so, in securing harmony of the organization.

Beside the detritus in the intestinal canal, we have the destructive poisons of perpetual bacterial life produced by the decomposition of food and excrementitious matters. In health these are readily thrown off by the excretive organs. If all these varied channels are not actively at work then accumulation of the poisons begin, and what we call disease manifests itself in that part or organ least able to perform its perfect work of elimination.

When the conservative vital forces are overcome, a poisoning of the system is the pathological result. This is established by the most unmistakable evidence. The origin of disease is frequently not suspected when in fact it arises simply from the imperfect digestion, assimilation, and absorption of toxic material which the vital forces are unable to render fit for the normal nutrition of the body. The elective action of the secretive functions is one of profound interest, and is as yet but imperfectly understood.

Alcoholic intoxication is simply a degree of nerve poisoning. If alcohol is absorbed it rouses the system to action, induced by vital resistance, to obtain relief from the intruding substance, but this is often mistaken for added energy by those who do not take into account the resultant facts.

Auto-intoxication may be defined as a self-poisoning of the organism, due to digestive or metabolic products of normal or abnormal formation, which the organism creates in the fulfillment of its own processes, and the failure of the emunctories to expel them from the body. Auto-infection is not the same as auto-intoxication, in that it is a re-infection of a new locality, of disease already existing in the same body. There is no distinct line between the different forms of auto-intoxication. The source of the products may be in the intestinal tract or in the tissues themselves. Examples of intestinal auto-intoxication are the nervous phenomena which occur in the course of acute or chronic digestive disturbances and most of the skin affections, also some of the anemias. There are various toxic substances derived from the intestines, food, and bile, that act as causative agents in the drama of auto-intoxication. The decomposition of fish, meat, salads, ice cream, vegetables, and even fruit forms toxic compounds of a most deadly character. Improper food, retention of excrementitious matter, altered secretions, and other causes, set up putrefactive changes and the generation of toxins which are auto-infectious.

It has been stated as most likely that tumors, both of benign and malignant character, have their origin in chronic auto-infection of the intestines. Take almost any symptom, whether fever, chills, perspiration, headache, etc., and the great majority are due, almost without exception, to the infection and auto-infection which has taken place in the laboratory of the body.

The cause of rigors and fever in malaria proceeds from the destruction of the cells and the liberation of their constituent elements. At times there is absorption of pus, which contains not only the poison of the bacteria growth that may be responsible for the death of cells, but also the poison of the structure of the latter.

All these are distinctions without much necessary difference in the form of treatment. It is conceded that the poisons elaborated within the body are a serious factor in disease. Practically it is difficult to distinguish between toxins produced within the body under abnormal conditions, the activity of bacteria, for instance, and those incident to metabolic processes, nor is it possible to state with exactness just what these poisons are. Urea, ammonium salts, uric acid, etc., have had their day of popularity. Ptomaines produced by normal physiological changes are proved to be generally harmless, but one thing we do know, that retained products,which ought to be eliminated promptly in the feces, the urine, or the perspiration are harmful.

A superabundance of nourishment in the blood, to say nothing of undigested nourishment in the intestinal canal, is dangerous, and when it accumulates in such large quantities that the emunctories can not easily dispose of it at once, it becomes a violent poison. This is the clue with which we can unravel many of the puzzles that have been baffling us for generations.

Ptomaines owe their development to the activity of micro-organisms, and the alkaloid formed depends upon the peculiar bacterium present, the nature of the material acted upon, the condition under which putrefaction goes on,

as well as the health of the individual in whose body the putrefactive processes take place. It has been frequently demonstrated that the nature of the soil alters the character of the micro-organisms that flourish upon it. The daily round of human life is a repetition of integrations and disintegrations, of processes of building up and breaking down. Ptomaines are to be regarded as "temporary forms through which matter passes while it is being transformed by the activity of bacteria from the organic to the inorganic state." The chemical action of ptomaines produced by germs so changes the blood that the proper amount of elimination is interfered with, thus leaving in the blood many of the nitrogenous bodies which should have been eliminated.

Man escapes intoxication by the intestinal, cutaneous, pulmonary, and renal emunctories. Bouchard says "copious perspirations may be useful in certain intoxications caused by poisons, because they expel the abnormal products which the organism has formed under the influence of the poisons."

Certain people have a fine eliminative apparatus, equal to any amount of work which is demanded of it, but with those having poor excretory organs poisons readily accumulate. We know that putrefactive processes in the intestinal canal, and the development of physiological and pathological alkaloids, play an important part in many disease processes, until lately unknown or misunderstood. Disturbances of nutrition cause, in the opinion of some of the best authorities, the largest number of chronic diseases, and explain the appearance of many illnesses of an acute character.

The living nature of contagious material is beyond all question. It has been demonstrated that in the body of an individual attacked by a contagious disease there exists the lower vegetable organisms capable of implanting themselves and multiplying in the tissues of an apparently healthy man, and of determining in him a disease similar to the original. Contagion is recognized as the function of a vegetable organism.

The healthy man is not attractive to the microbe. Disease infers an essential deterioration of the organism. Disease may follow upon nerve reaction, but it is the deterioration of the organism which hastens its outbreak and often renders it persistent and chronic. Men whose nerves are fatigued and excited by overwork or by dissipation, upon being exposed to depressing influences, are easily overcome by disease-developing conditions which would have produced nothing in perfectly healthy men.

The reaction of a disturbed nervous system induces temporary disturbance of nutrition. Nutrition is life. From increase of normal matter, or the production of abnormal, intoxication may be developed. The toxicity of intestinal matter is in part due to the poisonous products elaborated by microbes. If a portion of these products is absorbed, and disease prevents their elimination, there arises from this a poisoning which may become such that its absorption produces intoxication, in spite of the renal emunctory.

It has been theoretically as well as practically demonstrated that all the poisons pass into and out through the blood, certainly all those made by the tissues, and part of those which are formed by the digestive tube. The poisons which exist in the tissues and in the intestinal canal are also found in the urine. We also find alkaloids in the urine, all of which are necessarily brought there by the blood. It is thought that the poisons in the intestinal canal are innocuous to the animal which has formed them, while the same poisons become harmful to an animal of any other species.

The liver is an organ of protection to the economy, as it arrests or transforms more or less of the toxic material in general. Among its many functions, probably the most important and least understood is the elimination of poisons. It is often regarded as a digestive organ, but operations which have resulted in biliary fistula, both in animals and human patients, have demonstrated beyond doubt that the bile is nearly worthless as a digestive fluid. There is a con-

dition of hepatic poisoning, noted usually in hepatic sclerosis and in cases of hepatic torpor, which may be averted under favorable circumstances, but which is surely fatal if persistent.

Bouchard states that man is continually on the threshold of disease. Every moment of his life he runs the risk of being overpowered by poisons generated within his system. Self-poisoning is only prevented by the activity of his excretive organs.

Metabolism is taking place everywhere within the human body, with the result that the complex molecules of brain and muscle pass through intermediate stages, and are finally resolved into carbonic acid, water, and ammonia. A great impetus is given to disintegrating processes in organic matter by bacteria, especially so in the intestines.

Chemical investigation shows that disease depends upon the products of putrefaction and fermentation rather than upon the direct action of the microbes upon the tissues. It its this fact that renders knowledge of the life history of bacteria so valuable, for long after the microbes have been destroyed the ferments which they formed continue to act.

The treatment of auto-intoxication must be along one or more of three lines. The first and most important is to prevent the formation of toxins. This is best secured by regulating the ingesta, prohibiting or limiting those articles that are known to be favorable to the formation of toxins, and next, to check their penetration into the system by preventing absorption, as well as to avoid whatever may tend to weaken the patient or detract from his power of elimination. In fevers, especially typhoid, the secretions of the digestive tube are dried up or perverted. It is therefore impossible to feed the patient, and naturally all attempts at alimentation should be condemned. When it is permitted there usually follows an increase and prolongation of the fever. Even milk raises the temperature. Vegetable acids, like lime juice, are highly recommended.

Second, the use of intestinal antiseptics to absorb or precipitate the toxins, so as to render them innocuous. Charcoal has found favor in some hands. The individual who awakens with a sense of lassitude may be relieved by a simple injection, also one who is troubled with a headache, vertigo, with bitterness in the mouth, and who has a disagreeable odor from his breath and skin. This shows the part played by intoxication in the genesis of troublesome though slight nervous symptoms. The administration of a poison to counteract one already located is of more than doubtful utility. Indeed, it is not without peril, not alone from the added poison, but from complications that are sure to arise. The free use of pure water, which has always an absorbing capacity, is of undoubted value in diluting and accelerating the free exit of any poison. Particularly is this the case with the third line of treatment, which is to hasten and increase their elimination. This indication is capable of fulfillment in a greater or less degree according to the emunctory utilized. The common form is to stimulate the action of the bowels, while it frequently happens that such stimulation does little or no good, because, as one authority claims, the real emunctory is the liver, while Bouchard claims that the kidneys are the most important. The skin may be safely subjected to excessive perspiration, and by a judicious use of hot air all possible harm may be avoided. This not only relieves the kidneys, but acts in harmony with every natural function. Clinical experience has demonstrated this most satisfactorily. Herter has published reports showing that considerable amounts of urea and other nitrogenous matter may be removed through the skin. A writer in the *American Therapist* claims that nitrogenous matters, very insignificant in weight and scarcely capable of chemic estimation, but highly toxic in quality, may be removed by the sweat, and that too much attention has been paid to urea and uric acid, and too little to other waste matters.

XV. INTESTINAL AUTO-INFECTION.

By JOHN M. BATTEN, M. D.,
DOWNINGTOWN, PA.

I was called Feb. 21, 1898, to see W. F. B., aged 56 years, weight 220 pounds. He had been ailing for some time, and I had noticed for weeks that he had a gray, leaden complexion. Indeed, his complexion presented the appearance of one suffering with malignant disease of the liver. On Feb. 21, 1898, there was no disturbance of the circulation nor of the temperature. Both were normal. His tongue was clean. He was complaining of great prostration. I ordered him to remain in bed for a day or two, hoping that rest would be beneficial to him. I did not prescribe any drugs. About two days afterward, on his own account, he took a dose of calomel, which made him deathly sick and the consequent operation of the bowels still further prostrated him, so that he had to be assisted to bed from the chamber. From this period his tongue became coated with a white, thick fur, and red around the edges. His pulse became increased and his temperature higher. His bowels became constipated. There was eructation of gas from the stomach. There was gurgling in the right iliac region. This condition continued for a period of ten days, when his urine became loaded with urates together with the constituents of bile, and this condition of the urine continued throughout the remainder of the ailment, or until convalescence was established; also at this period, or at the tenth day of the disease, his stomach became irritable and he would often vomit, besides he suffered exceedingly with gas on the stomach. At this stage of the disease I concluded the patient was suffering with acute intestinal auto-infection, together with congestion or thickening of the lower end of the stomach and upper end of duodenum, and such too was the opinion of Dr. Thomas McCann, who saw the case with me. Earlier in the disease the symptoms were not unlike those of typhoid fever.

The infection was treated with antiseptics, and afterward the congestion of the lower end of the stomach and upper end of the duodenum with nitrate of silver and iodide of mercury. For the weak heart nitrate of strychnia was given. After the cessation of these conditions he had extreme pain in the right knee, then in the left knee, which

was succeeded by great tenderness along the right thigh in the region of the femoral vein. This condition may have been caused by bathing the patient in alcohol each morning by the nurse. She did this on her own responsibility. When I saw the patient each morning with a sub-normal temperature at this stage of the disease, I could not account for it. I finally ascertained that the nurse had been bathing patient with alcohol. I ordered the bathing stopped, and the temperature resumed the normal. In this we may be taught a lesson, that is, never to use alcohol for bathing in convalescence when it causes sub-normal temperature. In convalescing the patient's legs swelled. He was in bed two months and lost forty pounds in weight. At this period he began to sit up in his room. Indeed, he went into the dining-room and took dinner with his family, but did not venture to do so again for some time. The swelling of his legs and the urates in his urine continued, but there was no albumen in the urine. About at the end of two months and a half of the existence of the disease the patient ventured, although swelling of legs had not subsided nor the urine cleared up, to go to Mount Clements, Michigan, where he subjected himself to a course of hot bathing under the direction of the doctor in charge of that institution. After the doctor had examined patient he thought it a case of Bright's disease, but in this he was mistaken. At this institution the patient rapidly recovered his strength, and to-day, October 14, 1898, the patient is enjoying good health.

The cause of the disease in this patient was no doubt the carelessness on his part in securing daily evacuations of the bowels. This is another lesson this case teaches, and that is always to secure daily movements of the bowels. Sickness is either caused through our own neglect or ignorance, or the neglect or ignorance of somebody else in obeying the laws that govern health.

This patient had neglected the proper precaution of having a regularity in the movement of his bowels for months, hence the increasing poison from pent-up feces in the colon, cecum, and rectum day by day. If more food is taken into the system than is demanded for nourishment thereof, and the surplus is not excreted through the usual excretory channels, then this surplus is reabsorbed into the system

and acts as a poison to it. In this way many infect their systems constantly. We should learn not to eat more than we absolutely need for the nourishment of our bodies, and at the same time to be careful that the excretions are regularly carried off, so as to have the blood healthy and pure.

The alimentary canal includes the mouth, esophagus, stomach, duodenum, jejenum, ileum, cecum, colon, and rectum. These preside over mastication, digestion, assimilation, nutrition, together with secretion and excretion of the waste material of the body. The intestinal tract is that part of the alimentary canal extending from the stomach to the anus. It would be well in the study of this disease that regional anatomy of the intestines be clearly defined as well as the blood and nervous systems, as these are included in the anatomy of the intestinal tract. Besides neglect in the daily movement of the bowels, heat, cold, toxic influences of an internal or external origin, the use of unwholesome food, the various forms of intestinal diseases in adult life, sudden changes of temperature, cholera infantum, and other affections of the intestinal tract in infant and child life, are the intestinal diseases caused by auto-infection which are most difficult to treat. Typhoid fever may be the cause of intestinal auto-infection, together with disease of the heart, consumption, and all diseases of a lingering nature in which the organs of nutrition and elimination become very much debilitated. If, in disease of any character whatever, the effete matter is not eliminated, but allowed to accumulate in the system, it may cause intestinal auto-infection.

The symptoms of intestinal auto-infection, subjective and objective, come on so insidiously and deceptively that the general observer may overlook the real conditions of the disease and be thereby misled.

The diagnosis of intestinal auto-infection is most difficult. A differential diagnosis between intestinal indigestion and indigestion of the stomach is not always satisfactorily

made, as indigestion is always claimed to be from causes existing in the stomach. In connection with intestinal auto-infection we usually find the grey or cachectic appearance of the skin, with alteration of the glandular excretion of the skin.

Any pathological conditions in this disease are difficult to localize, and for this reason they may be overlooked. The application of any remedial agents, too, should be well considered.

The disease may be very slow in developing. At first there may be loss of appetite, headache in the morning. The abdomen may be pendulous. There may be languor and general depression of the nervous system, eructation of malodorous gas, and bad taste in the mouth. There may be drowsiness, with disturbed sleep and unpleasant dreams. There is often palpitation of the heart from pressure of the abdominal organs against the diaphragm. There is borborygmus, indicative of fermentation of the contents of the intestinal canal, with generation of gas. At times there may be melancholia, together with irritable disposition. The breath may be foul. The tongue is coated with thick, white fur, red around the edges, similar to a typhoid moist tongue. Night sweats in the latter part of the disease may be a frequent and alarming symptom. Women who lace tightly may be affected oftener than men. Their habit of eating pastry and other unwholesome food makes them easy subjects to the disease. Those who inordinately drink all sorts of spirituous liquors as a daily beverage are more likely to suffer from the disease than others. The daily use of cathartics or of the syringe to keep the bowels open may be a factor in the cause of the disease, and in every case should be decried. A habit should be established in all cases of having the bowels moved regularly each day at a certain time. After the breakfast meal is a good time for that duty. The bowels may be kept regular and soluble by partaking of proper food for that purpose, without resorting to laxatives

in the shape of cathartics or to the syringe. It is plainly evident, therefore, that the daily habit of using cathartics or the syringe should be condemned. The food should be well and wholesomely prepared and taken at set periods. Three times a day for the adult is the common prescribed custom for meals in this country. The Indian maize, well prepared, very much used when I was a boy, is much to be preferred as a regular diet to oatmeal.

In the initiatory stage of acute intestinal auto-infection calomel should be given in a single, large dose, to be repeated the next day if necessary, till the flow of bile is well established. Then antiseptics, with or without small doses of mercury, may be continued for some time or until there is an amelioration in the symptoms. If ptyalism occurs the mercury should be discontinued. When there is debility of the heart or an atonic condition of the bowels strychnia acts well. In the latter stage of the disease some of the natural mineral waters are very agreeable, besides beneficial. In convalescence vegetable tonics may be prescribed. If the kidneys are torpid and the legs dropsical, hot baths may be taken by the patient in connection with the vegetable tonics.

DISCUSSION.

DR. THOMAS HUNT STUCKY, Louisville, Ky.—I know of no subject being discussed more at the present time by the profession than that of auto-intoxication of the intestines, and the belief is becoming more and more prevalent that it is due to a disturbance of metabolism—whatever that may mean—within the intestinal tract. In regard to treatment, I either misunderstood the author of the paper as to the recommendation he gives, or there is an incongruity between his recommendation and the method he pursued in the case described. In the case referred to he apparently gave nothing in the way of treatment except rest; but in his advice, as I understood it, he lays stress on elimination. What I understand by auto-intoxication is the absorption of a poison due to the presence of something in the tract. Whether due to the absorption of decomposition or to the products of

faulty elimination, I understand it will produce an auto-intoxication. If that be true, it seems to me that the treatment narrows itself down to one word, "elimination." Whether it arises from a destructive process in the lungs or a destructive process within the liver or any other organ, if it gets within the intestinal tract the plain duty of the practitioner is to eliminate it from that tract, and at the same time guard against its re-accumulation in the storehouse, wherever it may be, from which it comes. Tuberculosis, Bright's disease, and many other diseases are apt to cause such decomposed matter to gather, and in due course it will get into the intestinal tract. The only treatment, as I have said, is elimination, and the prevention of the entrance of fresh infection into the intestinal tract.

DR. I. N. LOVE, New York.—The subject is certainly a vital one, and I think the solution lies in diet. The tendency of the majority of us—in fact of practically all of us, even after we have arrived at years of maturity—is to eat to excess. We ought to eat to live, but the majority of us live to eat. The consequence is that the more prosperous people become, and the more luxurious they get in their habits, the more frequently do they suffer from overcrowding of the alimentary tract. Sometimes the cause may be excessive diet, sometimes improper diet; but as a rule it may be laid down that stuffing is at the bottom of all these troubles. We have often such acute disturbance of metabolism from overeating as to produce temporarily all the symptoms of the most grave diseases, such as diabetes and Bright's disease. All the forms of suggestion of organic disease may be thus produced, and the result is that doctors frequently make a diagnosis of organic disease when there is really nothing more than functional disorder. I believe it is a common mistake on the part of practitioners generally to make too severe and pessimistic diagnoses. The solution of the problem lies mainly, if not entirely, as Dr. Stucky has said, in the word "elimination." That, however, implies elimination through all possible means. We must, with this end in view, stimulate secretion as well as excretion. Elimination includes nutrition, which is perhaps more important than anything else, and to secure proper nutrition the majority of people require not only carefully selected food, but reduced quantities of food. Another word—a most comprehensive word—should not be forgotten. It is "tranquilization." Rest, rest in the proper way. Victims of this disease are usually very restless. They suffer from insomnia and are haunted with bugaboos. They are depressed. For

them rest is of the greatest importance, and to secure this medicines are often necessary, but they should always be given with great caution. Many of the victims of this trouble have neuralgic headaches and other troublesome symptoms, and in their efforts to obtain relief may easily fall into the drug habit. The prescription of certain medicines is on this account to be avoided, and they are not generally called for, as all pain resulting from the condition in question can usually be relieved by some simple saline purgative. Another part of the treatment I would like to touch on, namely, exercise, judicious exercise. That is most important, whether it take the form of walking, horseback riding, or anything else suitable to the patient. If the patient can not take exercise himself, it should be given to him by a good masseur or otherwise. We are confronted, not by a condition nor by a theory, but by a serious fact, and we will best succeed in achieving the end in view if we move along the line of genuine tranquilization.

DR. A. P. BUCHMAN, Fort Wayne, Ind.—I have little, if anything, to say in line with the arguments expressed in the paper.

Some of the speakers have referred to a condition under the title of functional diseases, This, to me, has always seemed wrong. Any organ failing in its function is just to that extent pathologic, and it is at just this point that we are apt to fail in making up an opinion.

The human organism is beautifully self-cleansing and self-reparative, when given the opportunity. This is nowhere more strikingly illustrated than in general systemic intoxication of intestinal origin.

The whole question resolves itself to that of methods. Each method instituted implies a theory as a basis of action, and each such theory is based upon one's conception of normal organic maintenance, or, to say it in other words, true physiologic function and maintenance.

The theory which I have proceeded upon, and on which I now depend to sustain the statement that the human organism is self-cleansing and self-reparative, is that the entire absence of food for days and weeks together—erroneously styled the starvation method—will assist in bringing about harmony out of chaos quicker and more effectively than any other known method. The basis of this theory is that food is *not* decomposed into energy, but that its sole function is to supply waste tissue, and that all auto-intoxications of intestinal origin are due to abnormal amounts of food ingested, *i. e.*, more food taken in than can be digested,

hence decomposition and consequent poisoning. It follows then that the rational treatment consists in withholding food from these patients until such time when all disease-producing contingents will have been eliminated, and all damage repaired.

The forces engaged in this work demand intelligent and delicate assistance from time to time, such assistance indeed as demands the most keen appreciation on the part of the attending physician.

I have had patients go without a bit of food from fifteen to thirty days, and in this time have seen every disease symptom disappear. The skin becomes pink and elastic, the eyes bright, the tongue clean, sleep natural and easy, and every condition indicative of a normal organism present, except the natural and consequent emaciation.

This, however, need not create any apprehension. Begin at this point to feed very limited quantities of plain, simple, well-cooked food, gradually increasing the amount from day to day until a satisfactory limit is reached, and I assure you, you will not be disappointed in results.

This method is applicable to any disease condition, no difference under what circumstances it may come.

DR. WILLIAM BAILEY, Louisville, Ky.—I wish to refer to what has been said by two gentlemen who, as it seems to me, have exaggerated the importance of elimination as compared with the necessity that exists for the prevention of the poison. It is surely more important to prevent the toxin being made than to eliminate it afterwards. It is the more sensible and the more efficient course. If we really have auto-infection going on, elimination of course is necessary; but this should not make us overlook the fact that this auto-infection might often be prevented by limiting and regulating the diet and so securing proper secretion. I did not fully understand the essayist in one or two points, and particularly in this respect that at one time he seemed to oppose elimination by the alimentary canal, and at another time he advised it. And in regard to treatment I want to say this, that I think we are all too much inclined to take away from these organs the functions for which they were intended by nature. We give predigested foods, for example, and leave nothing for the stomach to do but take it up. Is this right? Would you relieve a muscle of its duties in order to give it additional strength? On the contrary, we know that exercise is necessary to strengthen a muscle, and it is possible that it may be the same with the stomach and other organs. That is to say, if we did not do so much in the way of trying to save them

work, but endeavored to encourage them in the discharge of the functions for which nature intended them, it might be better for them and for the entire system. The great thing, as it seems to me, is to get the organs back to their natural condition, and to encourage them to perform their functions without the assistance of drugs.

DR. GEORGE D. KAHLO, Indianapolis, Ind.—The indications for treatment in auto-intoxication will resolve themselves into one of three classes—prophylactic, cases of acute intoxication, and cases of a chronic nature. In considering the prophylactic measures, we can not emphasize too much the importance of a restriction in the amount and attention to the quality of the food which constitutes the ordinary regimen of the patient. It must be remembered, moreover, that both the kind and quantity of food to be allowed will depend greatly on the condition of the digestive organs. You may have auto-intoxication even in a normal state of the organs if the quantity given is too large, and it follows that much smaller quantities may produce it if the organs are disturbed in their action. Then as to acute auto-intoxication, I would simply say this in regard to treatment, that you must see to every means looking to the elimination of the poisons; and in cases of chronic auto-intoxication no less heroic measures will be called for. It is practically possible to get on without any medication. The judicious use of massage and baths will accomplish better results than medication. The indications for diet vary so much according to the varying conditions of the secretions that each case has to be dealt with separately.

DR. JOHN NORTH, Toledo, O.—I think the regulation of diet would be everything if we could start far enough back. All we can do, when cases come to us with auto-intoxication in active operation, is to regulate the diet for the time being, and take measures to facilitate elimination. The success of the patent medicine people—and many barrels of patent medicines are consumed every year—is due to the fact that they include in their preparations something that produces elimination; but in these cases nothing is done to regulate the diet, and so fresh auto-intoxication is continually caused until the victims get into a chronic condition, and have to come to a regular practitioner. We have all, however, the greatest difficulty in regulating the diet of our patients. As a matter of fact, we do not regulate it among ourselves. Every one of us by excessive and ill-regulated eating does a great deal to encourage auto-intoxication, and we do it every day.

DR. W. F. BARCLAY, Pittsburg, Pa.—I believe that I was the means of suggesting the subject of this paper. I was unfortunately the victim of serious auto-intoxication, and I wish to be frank with you in regard to it. I hope you will not think that I am disposed to be guilty of gluttony, and in this case overeating was not the cause of the disease. But I was guilty of using a syringe to correct a persistent constipation, and I paid the penalty almost with my life. Had it not been for Dr. Batten and some other good friends I believe it would have ended fatally. But through their kindness and skill I was enabled to work out my own salvation, and in doing so I learned a good deal. We all make mistakes, and I learned that I had made a serious one in using the syringe. My excuse is that it had been preached from the housetops by men of standing that the use of a syringe was better than taking cathartic medicines. That theory is now commencing to be pretty well dispelled. After my personal experience I read a paper condemning the use of syringes, and from the number of letters I received on the subject I am satisfied that my case was far from being a singular one. I think I hear my friend Dr. Love say that syringes should be used for emergencies. I am inclined to agree with him; but where any one falls into the unfortunate habit of using it regularly he is apt to be called on to pay the penalty, as I was almost with my life. I was under treatment for from four to six weeks, during which time I took all the medicine that was given me, except I think some iodoform. This was supposed to kill the germs; I think it did, and I am here to tell the tale. I believe the baths at Mt. Clemens were of great benefit to me, and I am also indebted to the action taken by my wife in causing a teacher of physical culture to call on me and induce me to undertake systematic gymnastic exercises.

DR. G. W. MCCASKEY, Fort Wayne, Ind.—The discussion has drifted into a very wide field. This, however, was perhaps inevitable, for the subject of auto-intoxication is a large one—too large, in my opinion, to be discussed in the time at our disposal. Auto-intoxication is due to a loss of balance between the productions and eliminations of poisons within the body. This is governed by a great many conditions that it would take time even to outline. We have to take into account the integrity of the physiological functions. We have to take into account the nervous system and its control of the vascular apparatus. If we would study the subject scientifically we must consider every function and tissue in the body, and also the processes by which toxins

are produced and eliminated. There are two principal sources of auto-intoxication. One is perverted metabolism, and the other what Adami has recently termed indirect auto-intoxication, arising from the gastro-intestinal canal. The latter is one of the commonest forms, but I believe it is never simple. In practically every case we have to deal with all the different conditions mentioned, and that physician will be most successful who is most familiar with all these facts. No general rule can be laid down, because each case is an individual problem. We must know the condition of the stomach and the intestines and also of the nervous system. In fact, the condition of the nervous system is one of the most important points, and it is well to be thoroughly informed on these matters before being too dogmatic about treatment and especially about elimination. I agree with the remark that the syringe is useful for an emergency. I believe in washing out the stomach as a means of bridging over an emergency, but with these methods of irrigation it is necessary to combine measures for improving tonicity.

. DR. C. S. CHAMBERLIN, Cincinnati, Ohio.—Dr. Love said these cases of auto-intestinal infection became more common as people grew older and more prosperous and therefore more prone to indulge in a more liberal diet. I beg to state that this has not been my experience nor observation, and I would support what I have to say by quoting the remarks of Mark Twain, who, in replying to an invitation to become a guest of honor at an important gathering, said it was difficult to understand why it should be so, but the fact was that when he was young and able to eat anything set before him and longed for just such invitations as these, he never got any at all; whereas, since he had grown old and feeble and his digestive organs were no longer in good order, he received more invitations than he could accept. I believe that most of these cases begin with people in poor circumstances, who are obliged to restrict themselves to the plainest and most inexpensive kinds of food. In most, if not all of them, there is constipation. Besides eliminating, therefore, we should take means to prevent the recurrence of the constipation. Most cases of constipation due to faulty diet are caused not so much by the quality of the food ingested as by its kind. We use too much animal food and food of a character which contains little waste material. I believe that if people generally would use more vegetables and other foods containing a large amount of waste material, and thus provide the intestines with a larger bulk to work upon, they would find themselves in much better physical condition.

DR. C. H. HUGHES, St. Louis, Mo.—I must protest against the assumption that neurasthenia is always a product of auto-intoxication; a neurasthenic condition usually precedes rather than follows auto-intoxication. Conditions in the intestinal tract of defective innervation make the formation of ptomaines and auto-intoxication possible. Of course we may have nervous symptoms resulting from any depressing toxemia, and physiological nerve-tired feeling from tired muscles, and they frequently simulate the symptoms of neurasthenia. But the entire subject of the connection between neuratrophia of the nerves and auto-intoxication is one of which we have not yet sounded the depths. Auto-intoxication is ordinarily the product of precedent neuratrophic conditions, and it may produce this state as the result probably, in most cases, of defective digestion. Something goes wrong with the processes of nature which transform food into digestible form and for assimilation, and food decomposition follows. Many patients who suffer from defective digestion are also neuropathic, and *vice versa*, but there is no reason for saying that as a rule neurasthenia is due to the auto-intoxication, but rather the reverse. The precedent condition being the nerve-tone failure of neurasthenia, neurasthenia usually precedes auto-intoxication. We often, however, see both conditions co-existing. Neither does auto-intoxication cause constipation, but rather the reverse, though both states may go together. As to treatment, I believe in the gospel of rest, but not in carrying it to the point where it may produce anemia and neurasthenia by bringing about an atonic condition. I would say—let the bowels rest; clean out the Augean stable; but see that the tonicity of the nerve centers is preserved, as that is as necessary as anything else for the prevention of auto-intoxication. Patients suffering from auto-intoxication never complain until they have lost their tone—are generally run down; and then many of them are more suitable subjects for the neurologist than any other kind of practitioner. We are all aware of the value of nux vomica as a means for giving tonicity to the non-striated muscular fibre of the intestinal tract. It enters into all rational treatment on physiological basis of constipation, because constipation is due to intestinal neuratony, a paretic and not readily responsive state of the intestinal tract to the debris of digestion, gastric and duodenal.

DR. ALBERT E. STERNE, Indianapolis, Ind.—We seem in this discussion to be taking in the whole realm of medicine. With each succeeding meeting we learn something new about this subject, and there has hardly been a meeting since I

became a member at which it has not been debated. In that it is like appendicitis in the surgical section. Now, it seems to me that, as a matter of fact, all the gentlemen who have spoken, as well as the essayist, are in the right, and they can not help it, although their views seemed somewhat contradictory; and the explanation of it is this, that the condition known as auto-intoxication has established a vicious circle. It is difficult to determine which is cause and which effect, which is primary and which secondary. As a matter of fact, both elements seem continually in play, and they act and react on each other until it is impossible to say where the starting-point is. There is one thing in regard to which I think we will all agree, and that is that there is no routine treatment which can be applied to all these cases. Dr. McCaskey has dealt with one side of the circle, and other speakers have dealt with other parts of it, but it is necessary to go all round if you would get rid of the condition. You must treat the neurasthenic conditions simultaneously with those of the intestines, which are usually of a very mixed nature. The whole condition of auto-intoxication is very like the case of a man who has a corn which has been produced by a tight shoe. It is not sufficient for him to get the corn removed. He must also get rid of the tight shoe which produces the corn. So with auto-intoxication. The toxemia must be removed; but at the same time steps must be taken to prevent its reproduction, and this can only be done by studying each patient individually and treating the disease from every different point of view all round the circle.

DR. BATTEN (in closing).—I am glad the paper has elicited such an interesting discussion. Dr. Stucky has misunderstood me in one point in which he thought I was inconsistent. The patient to whom I referred was active and walking on the street when he consulted me. I ordered him to bed. That was the only time I did not drug him somewhat. Dr. Barclay, as he has indicated, was the subject of my paper. I agree with most of what has been said by the gentlemen who have taken part in the discussion, for the subject is a very broad one, and can be looked at from many points of view. Strychnine was given in the case described, instead of nux vomica, as recommended by Dr. Hughes. As to exercise, my patient had gone to Mt. Clemens before he was in a condition for anything of that kind, but I agree that it was the proper thing for him to have done as soon as he was able.

XVI. THE DYSPEPTIC'S DIET.

By GEORGE D. KAHLO, M. D.,
INDIANAPOLIS, IND.

It will hardly be questioned, I think, that in the treatment of digestive disorders of whatever nature beneficial impressions may be made through the medium of the materia alimentaria as well as through that of the materia medica.

The dietetic management of the more serious organic diseases is comparatively simple, for it involves only the employment of a few foods of well-known digestibility, but when it comes to outlining a dietary of a variety and kind suitable for the milder conditions, as for example the purely dynamic affections, our task is one of no slight difficulty.

The futility of an attempt to formulate a detailed list applicable to all such cases is obvious when we consider the complexity of the subject, and I shall confine myself to general considerations only. We can no more employ one form of diet than we can use a single prescription to relieve a given symptom or cure a disease.

In other words, here, as in every other therapeutical measure, we must be guided solely by general principles, the intelligent application of which must comprehend a knowledge not only of physiologic digestive processes, the chemical composition of foods and the approximate quantity necessary to a healthy nutrition, but also, and what is of equal importance, an appreciation of the pathologic limitations of disturbed functions.

The particular phases of this subject to which I wish to direct your attention are the importance of securing a perfect nutrition and the influences upon digestibility of the conditions of motility, sensation, and secretion.

The practice of treating dyspeptics by giving some artificial digestant or simple tonic coupled with such directions as to "be careful of your diet" or to "eat only simple foods" has much to commend it on the ground of its simplicity and that it imposes no self-denial upon the patient, but do we, by the adoption of such a course, accomplish equally as good results as when we inquire minutely into the patient's habits as regards his ordinary regimen and then prescribe definitely and explicitly just what foods are to be permitted and what are to be excluded?

We may thus afford a temporary relief of symptoms and occasionally, although rarely, even effect a cure, but in most cases it is the abandonment of our greatest possibility for success.

Dyspeptics, as a rule, will be found to be following one of two extremes; either they eat everything, a practice of doubtful propriety even in persons with the best digestion, or else they have, by imposing one restriction after another, reached a regimen much below that which a rational estimate of their digestive capacity and nutritional requirements would suggest.

Both conditions afford excellent means for the perpetuity of a weakened digestion, a result which can not fail to follow their long continuance; but in seeking to correct errors of this kind we must be careful to avoid abrupt transitions.

We can not at once prescribe a diet of great variety to one who, perhaps for months, has been subsisting upon liquids and predigested foods, but nothing should be excluded without good cause, and we should seek to improve nutrition and strengthen digestive power by giving to the stomach such appropriately graduated exercise as further additions will permit.

A perfect nutrition can only be attained by a mixed diet, which must be sufficient in quantity and of a kind which will have represented in it a proper proportion of the elementary food substances. It is not within the scope of this

paper to discuss in detail the chemical composition of foods, nor the processes by which they are transformed into substances suitable for their utilization in the system; but I would emphasize the fact that the problem of nutrition is not a question merely of whether foods be animal or vegetable, but rather the relative proportion and digestibility of their nutritive elements.

As is well known, foods in general are classified according to their function into tissue builders and heat producers, the former being represented by proteids, mineral matters, and water, and the latter by proteids, carbohydrates, and fats.

The greatest difficulty is experienced in estimating the value of the proteid element, and this arises both from the fact that it has a dual purpose and origin and that the various stages in its digestion are marked by products of indefinite and unstable chemical composition. The essential things to be kept in mind are that proteids derive their chief importance in nutrition because they serve a double function and that these substances, as they exist in the animal kingdom, are comparatively simple compounds and easily digested, which is in contrast with their composition and behavior when derived from the vegetable kingdom.

Another factor, about which some confusion exists, is that it is not a matter of indifference from which class of food substances heat is derived. Carbohydrates and fats are both oxidizable compounds whose resulting products are carbon-dioxide and water, but in the former case the heat generated exercises its influence chiefly upon the spinal centers, while in the latter it is upon the cerebral.

Some knowledge of the approximate nutrient and kinetic values of the commoner articles of food will be of great assistance in estimating the amount necessary to meet the daily requirements, as also in combining the different kinds of food so that a deficiency of one group may find a compensation in an excess of another. Many factors influence

the question of quantity, among which are age, sex, occupation, climate, season, etc., but an average of these conditions, according to standard dietaries, is proteids and fats, each, 100 grams; carbohydrates, 400 to 500 grams; water, 2½ liters, which, if expressed in terms of potential energy, would be 3000 to 3500 calories.

Practically, we will transpose such equivalents into terms which are intelligible to the patient by suggesting that he eat sparingly, moderately, or abundantly of this or that food, according as we may feel that the state of his nutrition and digestion may require, but when it comes to the question of quality our recommendations must be much more explicit, a condition which can not satisfactorily be fulfilled without giving to each patient a detailed diet list, in writing, stating exactly what foods he is to eat, how they are to be cooked, and what are to be omitted. To this there should also be appended directions of a general character, such as relate to the relative proportion of solids and fluids, the regularity and frequency of meals, the hours for rest and exercise, the importance of thorough mastication, the care of the teeth, etc., all of which will have an important bearing on the results obtained.

It may be objected that such a plan tends too much to concentrate the patient's attention upon his own disability, and perhaps in a few instances, as for example conditions in which the disturbed digestion is secondary to some general neurotic state, this may be true; but patients, as a rule, do not fail to appreciate such painstaking effort in their behalf, and misunderstandings, with a continuance of dietetic indiscretions, are sure to exist without it. We need the full co-operation of our patient, and it will serve also to suggest to him many articles of food which, if left to the dictates of his own appetite, he would not eat, thus avoiding a monotony of which he would soon tire.

Monetary considerations must sometimes influence us in this selection, as many patients are unable to procure the

kind of food that would seem best adapted to their condition, but fortunately market prices do not always represent nutritive values, and we can obtain a considerable variety of foods which will meet all necessary requirements without adding greatly to their cost.

It is quite within our province to give attention to the preparation of foods for the market, and, as I have said, for the table. We should see to it, for example, that meats are of the best cuts obtainable, free from fat, and not used too soon or too long after killing; that vegetables and fruits are fully ripened, in season, and fresh; and that fish, oysters, eggs, etc., are likewise obtained fresh.

Refinements in the art of cooking are too often either disregarded or used only to appeal to the palate, and while it should be our aim to allow as great a variety as possible, both in kind and form, it should always be with due regard to the question of digestibility. The pernicious influences attributable to the frying-pan and the insufficient cooking of vegetables and cereals, the excessive use of concentrated acids and sweets, and the indiscriminate employment of spices and condiments are examples in point. Another and very common error, which is perhaps deserving of special reference, is the practice of allowing liberal quantities of fruits in order to overcome constipation. A laxative effect, if obtained, is usually at the expense of considerable fermentation and irritation, results which act only detrimentally upon other digestive processes.

When it comes to the question of what particular kinds of food will be found most salutary in a given case, and what must be used with greatest caution, this must depend upon the diagnosis.

The importance of modern methods of diagnostic technique in enabling us to clinically discriminate between the various forms of digestive disorders can not be overestimated. It is only by the application of such methods that absolute accuracy can be obtained, and while it is not always essential

in prescribing a diet, the knowledge so acquired is not without value, and in protracted and anomalous cases of the severe type much time and trouble may be saved by such an investigation.

Every disturbed function is a well-defined indication in dietetic as well as in medicinal treatment, the more important of which may be enumerated as follows:

In disturbances of motility, manifested by irritability, either in vomiting or in a too early evacuation of the stomach contents, we must select foods of a bland, unirritating character, and these considerations are equally applicable when there is excessive secretion or inflammation.

If there is hyperchlorhydria of a mild type, nitrogenized substances, especially meat, should be somewhat restricted, as these stimulate secretion; but in severe cases, particularly if pain be a prominent symptom, meats, and particularly eggs and milk, are indicated to combine with the excessive acid. Fats have an inhibiting influence upon secretion, but sugars and starches are not digested in an acid medium.

Conditions in which there is a deficient motility require foods of small bulk, non-irritating and readily soluble. The meals should be comparatively infrequent and the amount of liquids considerably restricted.

If there is subacidity, a diet composed largely of carbohydrates is most suitable. To these must be added, however, some fats and the more easily digested meats. Milk is not well borne in such cases.

Gastric fermentation, of whatever origin, furnishes an indication for the limitation of starches, sugars, and fruits.

Morbid sensibility is the result either of inflammation or of a neurotic state. It is well to begin with a more or less restricted diet, but in purely nervous cases we may permit a great variety of food and give our attention chiefly to extrinsic influences.

In pronounced anorexia, foods should be administered in small quantities at frequent intervals, and it is of importance that we avoid appealing to the patient's appetite by offering foods the chief value of which is in their esthetic qualities, when simple foods are refused.

When we are dealing with cases manifesting a disturbance of two or more functions, or in which there is coexisting failure of gastric and intestinal digestion, we will of course endeavor to so combine the special indications in each as to exercise the most favorable influence upon the whole condition.

We have in every case, also, the problem of personal idiosyncracy, and unless we observe carefully the results obtained, and whenever necessary make such changes as the evolution in the patient's condition and his experience may require, our theories, however refined and supported by chemical and physiological research, will lead us into numerous difficulties and embarrassments.

The evidences that a diet is correct are to be found in an amelioration of subjective symptoms, a disappearance in physical and functional signs, and usually also in an increased strength and weight.

There is no more adequate protection against disease than good digestion, and when we consider how important it is to preserve the functions of assimilation and nutrition in a wide range of affections not primarily associated with the digestive tract, the subject of dietetics should be one of interest, not only to the physician, but to the surgeon and the specialist as well.

A properly regulated diet and digestive hygiene is often of greater importance than medicine, and while there is lacking a complete unanimity of authoritative teaching, and the subject of dietetics is consequently still involved in some obscurity, much of the unsettled state of professional opinion is due to a failure to give it the consideration which it deserves.

The suggestions here offered are by no means considered as solving the problem. They are merely the result of an experience in following the teachings of others, and, to a certain extent, of a somewhat empirical personal observation. If they be deficient in that very essential quality of perspicuity, which alone can make them of practical value, it is because I have hesitated to impose upon your indulgence to an extent which a more detailed consideration would render necessary. I trust that these points may be brought out in the discussion, and that this paper, incomplete as it is, may at least serve the purpose of bringing the subject to your attention.

XVII. PHARMACOLOGIC ACTION OF DRUGS.

By E. M. HOUGHTON, M. D.,
Detroit, Mich.

While the original meaning of pharmacology was drug science in general, and the word is still used in this sense by the majority of the dictionaries and medical writers and speakers, I shall employ it in the restricted sense sanctioned by Schmiedeberg, Brunton, and other prominent European and American pharmacologists as "the study of the organism rendered abnormal by drugs," and shall discuss under the title "The Pharmacologic Action of Drugs" some of the reactions occurring between living organisms and foreign substances used in medicine. I believe we should look upon the subject of pharmacology in the same light as we do upon physiology and pathology, and pursue the study of it as a pure science, determining by careful and systematic laboratory experimentation the changes in living organisms and especially the changes in the physiologic action of the various organs of the higher vertebrates produced by a drug, before an attempt is made to employ it for clinical purposes. A much clearer knowledge of the pharmacologic action of a drug can be gained in the laboratory

than at the bedside alone, since by appropriate methods, employing dogs, rabbits, guinea-pigs, frogs, and the lower animals generally for the experiments, it is possible to determine the reaction of the brain, heart, kidneys, and other individual organs of the animal body with a much greater degree of accuracy than is ever possible where the drug is administered to patients in whom the normal physiological functions have become obscured by the disease process present. Finally, however, before the general adoption of a drug for clinical purposes, bedside study is necessary to complete our knowledge.

While a few substances employed in medicine exert their beneficial effects by their physical properties, most drugs are of service because of their chemical affinity for certain constituents of the animal body, thereby producing changes in the functioning of the various organs, such change in function being one of degree and not of kind, a reflex movement still remaining a reflex movement and under no circumstances ever becoming a voluntary act. Physiological chemistry has shown that the substances forming the nerve, muscle, gland, and other cells which constitute the different organs of the animal body vary greatly in their molecular structure. This fact is also evidenced by the elective affinity of drugs. How often do we take advantage of the specific action of strychnine on the protoplasm of the spinal cord; the glucocides of the heart tonics for their special influence on heart muscle cells; atropine, cocaine, etc., because of their peculiar reaction to the protoplasm of the terminations of nerves! In fact, nearly the whole fabric of modern therapeutics is woven from the threads of knowledge we possess relative to such affinity. If the secretion of a gland is rendered more profuse, the contraction of a muscle more vigorous, or the reflex activity of the spinal cord quickened by the administration of a drug, the fact is expressed by saying the drug is a stimulant; if the contrary effect is produced, it is called a depressant. Like the changes that can be produced

in organic matter generally, if stimulation or depression be pushed too far, the cell does not readily regain its normal condition; in fact, it may become paralyzed and die. Often we speak inaccurately of the irritant action of a drug as meaning the same as stimulation; but a distinction should be made, as irritation refers to changes in the nutrition and growth of the cells rather than to their specialized functions.

That the reaction of the protoplasm to drugs is quantitative in nature is generally recognized, since we habitually utilize this fact by prescribing variable doses of medicines to produce the desired effect. Notwithstanding, however, the almost universal belief in the quantitative pharmacologic action of drugs, a few writers have opposed it. During the past few years it has been my privilege to study this phase of the question, and, since the results of laboratory experiments are so positive in asserting the fact, I wish to briefly call attention to them. In several papers published on pharmacologic assay of the heart tonics I have spoken of the possibility of standardizing these most poisonous substances by their administration in proper doses to the lower animals, and have given in detail a method based on their killing power on frogs which could be employed with great accuracy, as shown by the following illustrations.

Three tinctures of strophanthus were prepared and placed in the hands of two persons, who were requested to compare their pharmacologic activity with that of a known sample of the drug and report their findings to a third person, who knew the actual strength of the samples.

Sample No. 1, possessing an actual strength of 55 per cent. of the standard, was reported to be 57 per cent. of standard, a variation of 2 per cent.

Sample No. 2, possessing an actual strength of 105 per cent. of the standard, was reported to be 107.5 per cent., a variation of 2.5 per cent.

Sample No. 3, possessing an actual strength of 100 per cent. of the standard, was reported to be 100 per cent., a variation of less than one half of 1 per cent.

In this instance the quantitative reaction of animal cells to drugs of vegetable origin is demonstrated.

In a paper presented at the last meeting of the American Medical Association, on the pharmacologic action of the preparations of the suprarenal gland, I stated, "Since we have no chemical means for assaying these products, it seems to me advisable to work out a pharmacologic method that could be readily employed to determine their strength. As the result of investigations along numerous lines, a method, which is based on the submaximum blood pressure obtained by injecting intravenously" different quantities of the adrenal preparations dissolved in water, and comparing the increased blood pressure produced in the carotid artery of a dog or other animal—the pressure being recorded by a manometer on a revolving drum covered with smoked paper—with the increased pressure obtained from the same artery when a known quantity of a standard preparation was similarly injected, has given me the most satisfactory results.

Three knowns were tested by this method and reported upon as follows:

No. 1. Actual strength 85 per cent., reported strength 88 per cent.; variation 3 per cent.

No. 2. Actual strength 40 per cent., reported strength 40 per cent.; variation less than 5 per cent.

No. 3. Actual strength 130 per cent., reported strength 135 per cent.; variation 5 per cent.

In this case the quantitative pharmacologic reaction of animal cells to products of animal origin is shown. Finally, to show the general application of the principle, a solution of sodium nitrite, an inorganic substance, was given to three different persons, who were requested to determine its minimum killing power for frogs by injecting it into the abdominal lymph sacs. Their results agreed within a few hundredths of a millegram as to the minimum total dose per gram body weight. Two unknowns were then prepared, and results obtained as follows:

No. 1. 60 per cent., strength of the original solution tested as stated above, reported 63 per cent.; variation of 3 per cent.

No. 2. 75 per cent., strength of the original solution tested as stated above, reported 71 per cent'; variation of 4 per cent.

Numerous other laboratory illustrations showing that the quantitative pharmacologic action of toxic substances may be taken advantage of for standardizing their activity for clinical purposes might be given, but the examples cited should be sufficient, since substances from the animal, vegetable, and mineral kingdoms are represented.

XVIII. ADRENALIN, THE ACTIVE PRINCIPLE OF THE SUPRARENAL GLAND, AND ITS MODE OF PREPARATION.

By JOKICHI TAKAMINE, M. D.,
New York City.

Probably most of you have read an account of the isolation of the active principle of the suprarenal glands by myself, and I have no doubt that a good many of you have used the product. Inasmuch, however, as this subject of the isolation of the active principle of this particular gland may give good impetus to isolation of the active principle of other interesting glands, I venture to submit before you a brief sketch of this active principle, particularly in connection with its mode of manufacture.

Forty-six years ago, Addison first observed the certain changes of the suprarenal glands and their relationships to the disease now bearing his name. Oliver and Schafer's work on the physiological action of the glandular extract was soon followed by Scymonowicz, Cybulski, and later by many others. The suprarenal therapy has since become not only a subject of scientific interest but has successfully been applied in various branches of medical practices. Marvelous therapeutic value of the suprarenal extract has now been established and proved beyond all doubts.

As the use of suprarenal extract increased, a keen desire to obtain its active ingredient in pure state was generally felt by medical practitioners, for reason that the said extract is prone to deteriorate very rapidly and hence the necessity of preparing fresh each time before use.

Many able chemists turned their attention toward isolation of the active principle, desiring it might become a very useful agent in therapeutics. So far as chemical nature is concerned, but little knowledge has been contributed over Vulpian's original observation that ferric chloride and iodine imparts characteristic hues to the glandular juice.

J. J. Abel's investigation on the subject has no doubt thrown some light on the chemical side; unfortunately for him, however, he was not working with the active principle, but a somewhat modified substance, or the benzoyl-compound, which withstood his autoclave treatment.

Otto von Furth, of Germany, worked on the same line of research and has already written several papers, in which a controversy against Abel's epinephrin was entertained. Epinephrin is a substance in suprarenal glands isolated by Dr. Abel and claimed by him to be the active principle.

It was Furth who declared that epinephrin is not the active principle of the gland but an inert substance mixed with diversified proportion of his suprarenin, which he claims to be the real principle, according to conditions of preparation, hence its variation of physiological activity. Epinephrin may be made entirely inactive by simply refining it. This was also observed by Abel, who ascribed its modification to the nature of the substance and concluded that there are at least two isomers of epinephrin, namely, active and inactive.

Suprarenin, according to its author, is obtained from the filtrate, in which Abel considered no epinephrin does exist. The wide difference in the process of preparation and almost entire dissimilarity of chemical reaction of the suprarenin and epinephrin tends to put outsiders in obscurity in determining whether or not there are two ingredients in suprarenal glands, exerting similar physiological activity.

Abel, however, recently published a further observation on epinephrin in March number of the Johns Hopkins Hospital Bulletin, 1901, in which he substantiated Furth's statement that the unaltered or rather native active principle of the gland is not at all precipitable by ammonia, and naturally he recognized epinephrin was indeed a modified substance of the active principle, as Furth argued, thus having partly concluded the dispute between the two authors. Still, however, there remains a question whether suprarenin be the pure active ingredient or a mixture thereof with more or less inert matters, as long as Furth can not get it in pure, stable, definite forms.

During last summer I have devoted my attention to this subject and am pleased to announce that I have succeeded in isolating the active principle in a pure, stable, crystalline form, the base itself. I do not by any means desire to usurp the credit due to the pioneer investigators, yet in view of the fact that neither of the authors quoted above have obtained the active principle in a pure form, and that there may exist some room for controversy, I have, therefore, termed my substance, as I isolated it, "Adrenalin."

Adrenalin is a light, white, micro-crystalline substance having, so far, observed to separate in five different forms of crystals, according to the condition of solutions from which they be crystallized. 1. Prisms; 2. Fine needles; 3. Rhombic plates; 4. Boat or leaf shaped; 5. Wart-like.

Adrenalin has a slightly bitter taste and leaves a numb feeling on the tongue where it has been applied. In dry form it is perfectly stable. Adrenalin shows weak alkaline reaction on moistened litmus paper. Phenolphtalein also indicates slight alkalinity. It is soluble with difficulty in cold water and more readily in hot water. From the hot saturated aqueous solution the crystals separate on cooling. The colorless aqueous solution of adrenalin is prone to oxidation, absorbing oxygen from air and assuming colors from beautiful pink to red and eventually brown. It is easily

soluble in acids and alkali hydroxydes, forming salts. Ammonia and alkali carbonate to not dissolve adrenalin. Adrenalin solution made alkaline with alkali hydroxydes and carbonates, as well as alkaline earth hydroxydes, readily absorbs oxygen from air, its rapidity exactly proportionate to the strength of alkalinity.

The following are some of the characteristic reactions: Ferric chloride colors adrenalin solution emerald green, while iodine imparts a vivid pink, as first observed by Vulpian. A careful addition of caustic alkali to the green solution colored by ferric chloride gives rise to the various shades of hue ranging from purple to carmine red, which is destroyed by careful neutralization with acids, restoring its original color. Oxidizing agents such as nitric acid, potassium bichromate, and ferricyanide, etc., behave in a manner similar to iodine. Gold chloride is very energetically reduced by adrenalin and a complete separation of the metal follows, from acid solution, by application of gentle heat: resultant liquid is colored pink or carmine red according to the strength of the solution used, as is the case with different oxidizing agents.

None of the following alkaloidal reagents produce precipitation: Mercuro-potassium iodide, picric acid, tannic acid, phosphomolybdic acid, phospho-tungstic acid, mercuric chloride, acetate of lead, potassium bichromate, and platinum chloride.

Combustions of adrenalin have been made in my laboratory and the following results were obtained:

	I	II	III	IV	AVERAGE
C,	59.54	59.33	59.40	59.28	59.38
H,	7.99	8.13	7.62	7.62	7.84
N,	8.40[1]	8.13	7.74	7.76	7.88
O,					24.90
					100.00

The probable empirical formula of adrenalin, calculated out of the above figures as basis, is $C_{10}H_{15}NO_3$.

[1] The figure of N under No. I was roughly estimated by the Kjeldahl method, with the intention to have an approximate amount of nitrogen and therefore may not be regarded as accurate.

One hundred parts of adrenalin needs nearly 19 parts of hydrochloric acid in forming a neutral salt, and this substantiates the approximity of correctness of the formula, for 100 parts of the substance requires, by calculation, exactly 18.5 parts of Hcl.

T. B. Aldrich, of Detroit, reported in his paper (August number of the American Journal of Physiology) that he had also succeeded in the isolation of the crystalline active principle of the suprarenal glands and found his substance was exactly identical with my adrenalin.

Aldrich's formula is $C_9H_{13}NO_3$, which differs with mine by less CH_2, and Aldrich observes that if we subtract a benzoyl residue (C_7H_5O) from Abel's formula for epinephrin ($C_{17}H_{15}NO_4$) we obtain $C_{10}H_{10}NO_3$, which is not very far from Aldrich's own result.

It will serve some interest to arrange tabularly empirical formulas of the glandular active principle, according to the results and claims by different authors:

FURTH	ABEL	ALDRICH	TAKAMINE
$C_5H_7NO_2$	$C_{17}H_{15}NO_4$	$C_9H_{13}NO_3$	$C_{10}H_{15}NO_3$
$C_5H_9NO_2$			

The further investigations on different chemical behaviors of adrenalin will help to determine the correct formula for this interesting product.

The mode of preparing the active principle of the suprarenal gland is as follows: Suprarenal capsules, finely disintegrated by suitable means, are steeped in water or acidulated water for a period of about five hours, at a temperature varying from 50 to 80 degrees centigrade, with frequent agitation and with the addition of water as it evaporates. The temperature of the mass is now raised from 90 to 95 degrees centigrade for the period of one hour, so as to coagulate as much albuminoid bodies as possible.

As the active principle of the glands is prone to absorb the oxygen from the air, to form inactive substance, it is necessary to avoid exposure of the liquid to the air as much

as possible. A layer of fat floating on the surface of the mass acts very conveniently for this purpose, and at the same time it has the effect of retarding evaporation of water as well. Other methods of preventing oxidation may be employed at this stage, such as conducting the steeping process in an atmosphere of carbonic acid gas. The mass is now pressed and separated from the liquid portion, which contains the active principle. The mass is again steeped for hours in warm water slightly acidulated with acetic or hydrochloric acid, in order to extract the residual amount of active principle. The liquid separated from the mass is now added to the first extract and allowed to separate from the oil. The clear extract is now evaporated in a vacuum pan to a suitable strength. To this concentrated solution about two to three times its own volume of strong ethyl alcohol is added, or more economically wood spirit, which will precipitate both inert organic and inorganic substances. The inert substances thus separated are washed with alcohol so as to free it from the active principle. The alcohol solution is now evaporated, preferably in vacuum still, whereby the alcohol used is duly recovered. To the residual, liquid ammonia is now added until the solution gets distinctly alkaline, and left over for several hours. A yellow-brownish precipitate will be formed, which is the crude adrenalin in a basic form. The precipitate is now filtered, washed with water, and dried. The impure adrenalin usually precipitates in a light yellow-brownish tomato-shaped form, but not infrequently in needles, which the former is an agglomeration of needle crystals and is more or less contaminated with coloring matters and some inorganic substances, chiefly phosphates.

Instead of using ammonia, sodium hydrate may be used as precipitant, but care must be taken not to use in excess, which redissolves adrenalin. In order to counteract caustic alkali, ammonium chloride or carbonic acid may be conveniently used. In fact, the various modifications and combinations of these processes may be adopted.

For the further purification of the adrenalin, the crude adrenalin is dissolved in acid and alcohol and ether is added to a sufficient quantity. A brown-colored precipitate is produced, which consists chiefly of coloring matter and inorganic impurities. The precipitate is separated both by decantation and filtration. The filtrate is now treated by one of the above-mentioned processes, when white crystalline precipitate of adrenalin will be obtained. It is quickly filtered, washed with water and then with alcohol, and dried. The process of purification may be repeated, if desired, two or three times.

The physiological activity of adrenalin thus isolated is astoundingly strong. A fraction of one drop of aqueous solution of adrenalin or its salt in strength of 1:50,000 blanches the normal conjunctiva within one minute. It is the strongest hemostatic agent known.

The intravenous injection of adrenalin produced a powerful action upon the muscular system in general, but especially upon the muscular walls of the blood vessels and the muscular walls of the heart, resulting in an enormous rise of blood pressure.

The above result, as well as other experiments, indicates that adrenalin is over one thousand times stronger than the fresh glands.

The therapeutic applications of adrenalin are already numerous and new uses for it are constantly found by investigators. Generally speaking, adrenalin when locally applied is the most powerful astringent and hemostatic known. It is useful in all forms of inflammation and is the strongest stimulant of the heart. It is non-irritating, non-poisonous, non-cumulative, and without injurious properties. It has been used with good results as an antidote in morphine and opium poisoning, in circulatory failure, in the prevention of collapse in anesthesia, and in allied conditions. It is invaluable in carrying out bloodless operations in nose, eye, ear, and throat work. It has also given good results in some

cases of deafness, hay fever, nasal hemorrhage, and various forms of heart disease. Such authorities as Doctors Mayer, Wilson, Bates, Reichert, Ingalls, Stucky, Johnson, Chambers, Curtis, Swain, and many others have reported very favorable results.

A convenient form to use the adrenalin is the solution of its chloride, one part of adrenalin in one thousand parts of water. It was found desirable to add sodium chloride to form normal salt solution. In order to insure the stability of the solution, one-half per cent. of chloroform-acetone or chloretone is added with advantage.

Adrenalin can be made in the form of tablets, usually the tartrate or boro-tartrate. The tablet may be made with sodium chloride, so that when it is dissolved in a known quantity of water it will form a solution of desired strength with normal salt.

The therapeutic efficacy of adrenalin has already been established beyond doubt, and it will unquestionably obtain a prominent place in the materia medica.

There are several useful applications of adrenalin in arts and industry; for instance, a developer of photographic plates, as a reducing agent in chemical analysis, art of dyeing, etc.

In concluding this paper, I desire to state that my thanks are due to Dr. E. M. Houghton, of Detroit, for making the physiological test, and also my thanks and large share of credit are due to Mr. Wooyenaka, my associate, for his energetic and able assistance in accomplishing this interesting investigation.

DISCUSSION.

DR. CAROLUS M. COBB, Boston, Mass.—I have used adrenalin to a considerable extent in cases of vaso-motor rhinitis, both in that form of the malady which is commonly known as hay fever and in other varieties. The preparation, I have no hesitation in saying, has many advantages compared with the fresh suprarenal gland, which has always

been open to objection because it had to be specially prepared every time it was required, was always of more or less uncertain strength, and was sure to break down and become disagreeable. I have not only used adrenalin in a spray, but also in an ointment containing about a drachm of the preparation in an ounce of vaseline. This the patient can apply himself, and it works beautifully. With the proper use of adrenalin in these forms it is possible so to treat hay fever of the autumnal variety that patients can be rendered so comfortable as to be able to live about where they choose and do very much as they choose. The preparation undoubtedly works marvelously, and it keeps well in the ointment, and I have no doubt will keep well also in solution, although it turns red.

DR. JOHN NORTH, Toledo, Ohio.—I think the profession is very much indebted to Dr. Takamine for the preparation of adrenalin. I have used it from the very first, the manufacturers, Parke, Davis & Co., having sent me some samples of it when it was brought out. The results I have obtained are highly satisfactory. It has enabled me to perform certain operations on the nose without drawing enough blood to do more than moisten the instrument. Sometimes I have seen not more than a drop or two produced in removing a spur from the septum. As to secondary hemorrhage, it is not more apt to come on with this preparation than when the fresh gland is used. I have never had a case of severe nasal hemorrhage after using it; and in one case I succeeded by its means in arresting a hemorrhage which I had tried in vain to stop by plugging and other devices. I have also had satisfactory experience with adrenalin in the treatment of hay fever. I would like to say more about the preparation, but time does not permit.

DR. G. W. MCCASKEY, Ft. Wayne, Ind.—My experience with adrenalin has been somewhat limited, but I have obtained good results from its internal administration. I have seen the heart drop from 20 to 25 beats a minute through its influence.

THE CHAIRMAN (Dr. Charles F. McGahan, Aiken, S. C.)—I have had a good deal of experience with adrenalin since it came out, and so far I have not discovered anything in its action which does not call for extreme satisfaction. I have, moreover, heard a good deal in its praise from other practitioners. One of my friends, on calling upon me, told me of a case of so remarkable a character that I am tempted to mention it, though as the case is likely to be reported in detail I will withhold the name of the physician. It was the

case of a patient residing in Washington, who had a troublesome growth or gathering at the top of the larynx. Two of the best nose and throat men in Washington came to the conclusion that it was a malignant affection, and it was thought the patient had not long to live. Under the circumstances the physician in attendance thought there would be no harm in spraying it with adrenalin, which he did in the hope that it would afford some temporary relief. The result, to his surprise, was that the gathering disappeared, and the patient has gone to Atlantic City and is doing well. I myself have used adrenalin a great deal in nose and throat work, and I can corroborate all Dr. North has said as to the bloodless operations it renders possible. My usual procedure, after getting the nose open and free, is to put in some oily solution and then give the patient a weak solution of adrenalin, 1:5,000 or 1:10,000, with which to spray himself at home. In my part of the country we do not cure all our patients with iodide of potassium, as the gentleman from Florida says he does; but we always aim at giving the patients relief, and then we proceed to see if we can discover the cause of the malady, with a view to the prevention of its recurrence. Adrenalin is a great aid to us in this connection, enabling us, as it does, to make bloodless operations and clear out the cavities, and after this has been done an oily solution is applied and the patient is in a condition to enjoy a comfortable night's rest.

DR. MOYER.—Is it better in all cases than the suprarenal gland?

DR. MCGAHAN.—Yes; because it is simply an extract of the gland minus impurities.

XIX. AMERICAN ABORIGINAL (INDIAN) CONTRIBUTIONS TO THERAPEUTICS.

By B. T. WHITMORE, M. D., LL. D.,
New York City.

What charm attaches to the name "Indian" that it should be potent to delude the unthinking laity in favor of nostrums which as a class are vended with the most disgraceful methods of the quack and the mountebank? With the fact that some such potency exists we are all acquainted, and those of us whose practice has fallen in country places are only too familiar with the physical piracy of those who sell at beat of drum and blare of trumpet the "world-renowned Indian remedy discovered by the (blank) Indians and used by them with unfailing success on the Western plains in the cure of all diseases that flesh is heir to." The blank is to be filled in by the name of such tribe of Redskins as has not yet been preëmpted by rivals in the nefarious commerce. From a source in no sense medical, but rather theatrical, and therefore concerned with the fake side of the proposition, I have culled the following advertisements, which you will observe have their bearing on the subject:

WANTED.—A low comedian who can double in brass with the Assiniboine Remedy Troupe No. 2. All-tent show.

WANTED.—First-class lecturer with the Saskatchewan Medicine Company. Natural long hair and Buffalo Bill makeup required. Extra pay for Dr. Carver act. No bums.

FOR SALE.—Full set of paper Nescalero Apache Remedy, including snipes, handbills, single-sheet, three-sheet, and nine-sheet stands.

Some of these things are blind to the ordinary comprehension, but it is apparent that they are couched in language which conveys its meaning to those who are likely to enter upon the business of Indian remedies.

It is not only in modern times that the name "Indian" has been found a word to conjure with. The first recorded

mistake in America was when Columbus dubbed its aboriginal inhabitants the "Indians" under the erroneous impression that his westerly course had carried him to the Indies.

While the employment of the term Indian in connection with remedies is as much a misnomer as was its application by Columbus to the aborigines, none the less it leads to a consideration of the remedial agents now employed in regular medicine which we have received from our aboriginal predecessors on this continent.

Consideration of this subject involves, first of all, the study of What remedies did the aboriginal inhabitants possess? How readily, in the second place, could the early settlers learn from them their medical possessions? Under this heading we encounter the grave differences of language and the social incompatibility of intercourse between the two races.

Relations of the two races must follow the historical and geographical order, whereby there are found three positive classes. Corresponding to the first English settlement upon the main continent of America, we encounter the people of the Appalachian province, from the summits of the Blue Ridge to the sea, the region politically included in the original thirteen colonies. Having passed both in time and space the original settlers of the Atlantic seaboard, we encounter for our second division the aborigines of the second racial division, those of the valley of the Mississippi and confluents, bounded eastward by the western slopes of the Appalachian ranges and westward by the foothills and steeps of the Rockies. In the third group we compass, both in historical development and in geography, the Cordilleran people, whose habitat is the mountain country including the Rocky Mountains, thence westward across the Great Basin and the Sierras to the shore of the Pacific. Looked at from the view-point of discovery, we find on the one verge the Pilgrim Fathers; on the other the blind discovery of California by Sir Francis Drake in the "Golden Hind," and, in between,

the great chain of the discoverers of the prairie lands. Looked at more critically, we find it essential to examine the individual nature of each set of explorers in connection with the aboriginal races of their discovery.

Selecting for our first examination the Appalachian province, we find small settlements of individual families coming from Europe, self-centered and engaged in remorseless and individual contest with the neighboring Indians. Combining the individual successes or failures of the early colonists of this region, we find the result in extermination of the Indians, either near and immediate, as in the case of King Philip's War, or more proximate, as in the case of the rise and fall of the Iroquois Confederation.

Removing the field of operations west of the Alleghanies, we find a distinct principle ruling. In the Eastern littoral the conflict has been waged by the individual settler in defense of his farmstead against the red foe. Passing to the prairie regions, the same combat is now waged by the organized forces of the new republic under such commanders as Hull and Wayne. Substituted in this instance for the force of individual combat of each settler against the Indian foe are the contests of the small forces of the United States in the war with Pontiac and the Black Hawk War. In these cases the record is one of warfare, whether private or national, but war none the less, a series of circumstances under which communion between the victors and the vanquished is practically impossible.

Turning to the third division, or Cordilleran division, we find in the main a system in which warfare is absent, intercommunication therefore more feasible and with more lasting results upon the surviving aborigines and the European conquerors and settlers. That such intercourse has been of long continuance is immediately manifest when we observe the very large amount of mixed blood from Mexico northward and the large admixture of Spanish words, either whole or distorted, in the Indian languages of the Southwest.

Another strongly controlling factor remains to mention, for it will be found to have exerted its action additionally in the same direction as the forces of war and settlement just mentioned. This factor is the potent one of theology, that term, rather than religion, being used advisedly. At the time of the first settlements of America, and for long years later, theology was essentially polemic, a thing to fight over. Theological differences strongly characterized the differences of the treatment of the Indians by the first settlers, already sufficiently divergent on racial considerations. The difference may be concisely expressed as that of parson and priest. The Appalachian settlements were almost solely founded by those who dissented from official religious forms and sought the wilderness for the opportunity to worship after their own notion; it is clearly not the idea of religious freedom, but of narrowly localized religious intolerance, as may be seen in the manner of treatment awarded by Boston to the Quaker, by Plymouth to the Baptist. In such a scheme of theology the conversion of the Indian played but a small part. When one has referred to the labors of John Eliot and to the fact that Dartmouth College failed from the beginning to accomplish anything on its original plan as a school in the wilderness for the education of Indian youth, it would tax any but the most minute historian to suggest any further evidence that the conversion of the aborigines was any object on the part of the fierce theologians who settled the greater part of the Appalachian littoral.

On the other hand, in the region of the Spanish settlement, the Cordilleran division of this summary sketch, the conversion of the savages was put forward as the prime object of the conquest, and at no time, in the most romantic periods of subjugation and the acquirement of wealth beyond the dreams of avarice, was this object permitted to occupy other than the first place. The social position of the Indian when converted or under process of conversion may have been for all practical purposes that of slavery, yet

the fact remains that the individual Indian was brought in close relations with the individual European in a measure that had no existence in other parts of America, and while the Indian was learning something of the customs of his conqueror, the European in the Cordilleran region had the opportunity to acquire some familiarity with the customs of the subjugated race.

This is in no sense merely the theory of history. It is amply corroborated along the several lines in which Indian influence is to be recognized in American history. It finds equal confirmation in this special inquiry as to our medical heritage from the Indians. The pharmacopeia recognizes our debt to our aboriginal predecessors in twenty-six medicinal agents. Of these, four are plants of such general diffusion that it is not proper to refer them to one region more than to another. Of the remaining twenty-four, the Appalachian region gives us eight, the prairie region but two, while the Cordilleran region, with twelve, gives us more than the two other regions put together, being practically half of the sum total of the Indian contributions to our medicine. It has already been shown that this was the region of settlement in which alone was there any marked opportunity for such intercommunication as would permit the acquisition of Indian remedies.

That the Indian contributions to medicine have been so scanty is certainly due to the fact that even in the region where the bars to intercourse were let down there was really very little to contribute. This involves the necessity of a brief consideration of what Indian medicine was.

With the exception of the sweat-houses (temescales or sudatoria), some domestic poisons, and remedies against snake venom of doubtful value, Indian medicine was altogether comprehended in the Medicine Lodge and the Medicine Man.

It is evident that the universal employment of the term Medicine Man in designation of a person having important

functions in every encampment of Indians has led to the belief that Indian medicine must occupy some relatively high plane of development. If to this be added the observed fact that in general the Indians are men of robust health and free from minor diseases, the unthinking laity may arrive at the conclusion that the so-called Indian remedies will do as much for the white man.

In this chain of deduction there are three fundamental errors. In the first place, the Medicine Man is not a physician, even of the most elementary sort. In the second, the rugged health of the savage Indian is not at all traceable to any system of anything approaching medication. Finally, the so-called Indian remedies are not derived from any real Indian practice. Even one of these errors would be fatal to the argument.

The term Medicine Man is clearly due to the experience of the Indians with the early voyageurs and missionaries of the French race, who conducted wide explorations into the heart of the continent through the northern waterways of the St. Lawrence and Ottawa rivers and the Great Lakes, and thus obtained access to the Mississippi through its confluents from the northeast. The argument will be found developed at length in "The Story of the Indian," by Dr. George Bird Grinnell, the most distinguished living authority upon the American Indian. Briefly put, his argument is that the savages were struck with wonder at the healing accomplished by the French physicians (medecin). They were unable to appreciate any value attaching to the drugs that had been employed except in so far as they conceived them to be the foreign representatives of their own bags, rattles, and pipes, to each of which the descriptive term "Medicine" was later applied. Knowing themselves to be mere sorcerers, conjurers, or whatsoever term may be commonly applied to thaumaturgists, they considered the French *medecins*, really physicians, to be of the same sort but superior in power and in methods. For this reason they were

quite ready to adopt the foreign title of Medecin, and thus the way was prepared for the dissemination of the term Medicine Man. Miracle Worker would better represent the idea which the Indians had in mind, but the error made by the savages has passed over to the people of superior culture, and the Medicine Man has been erroneously considered to be a man who had to do with the healing art.

Before taking up the remaining flaws in logic stated in a preceding paragraph, it will be well to give some attention to what knowledge has been preserved of the practice of the healing art among the American savages.

A concise statement thereof is found in the work above cited (Story of the Indian, page 175), as follows:

"A considerable proportion of the 'medicine' performances in any camp have to do with healing. While the Indians are skillful in curing simple ailments and in surgery of a certain kind, there are many more serious diseases which they do not at all comprehend, and for which they have no medical treatment. Such diseases they believe to be caused by evil spirits, which must be driven away by the dream power of the doctor, who relies for help on this power and not on any curative agents. The treatment consists of burning sweet-smelling vegetation to purify the air, of singing and praying to invoke the help of the power, of rattling and making alarming sounds to frighten away the evil spirits, and of sucking and brushing off the skin of the patient to remove the mechanical cause of the disease. Usually such treatment gives no relief and the patient dies, but in wounds or other injuries these doctors have a success which oftentimes is very remarkable."

From "Blackfoot Lodge Tales," of the same high authority (page 281), some further details are to be derived, as follows:

"Disease among the Blackfeet is supposed to be caused by evil spirits, usually the spirits or ghosts of enemies slain in battle. These spirits are said to wander about at night, and whenever opportunity offers they shoot invisible arrows into persons. These cause various internal troubles, such as consumption, hemorrhages, and diseases of the digestive organs.

. . . Less important external ailments and hurts, such as ulcers, boils, sprains, and so on, are treated by applying various lotions or poultices, compounded by boiling or macerating certain roots or herbs, known only to the person supplying them. Rheumatic pains are treated in several ways. Sometimes the sweat lodge is used, or hot rocks are applied over the place where the pain is most severe, or actual cautery is practiced by inserting prickly pear thorns in the flesh and setting fire to them, when they burn to the very point. . . Whenever a person is really sick a doctor is sent for. . . . The doctor is named I-so-kin'-uh-kin, a word difficult to translate. The nearest English meaning of the word seems to be "heavy singer for the sick." As a rule, all doctors sing while endeavoring to work their cures and, as helpers, a number of women are always present. Disease being caused by evil spirits, prayers, exhortations, and certain mysterious methods must be observed to rid the patient of their influence. No two doctors have the same methods or songs. Herbs are sometimes used, but not always. One of their medicines is a great yellow fungus which grows on the pine trees. This is dried and powdered, and administered either dry or in an infusion. It is a purgative."

The latter citation having shown that all the Indian doctors are vocalists, one further citation may be permitted as indicating the outward and visible sign of the healing art. It is taken from "Pawnee Hero Stories" (page 98), as follows:

"This is the sign of a doctor. When you see a person putting mud on his face or head, it shows that he has faith in the earth. From the earth are taken the roots that they use in medicine."

While interesting to the student of savage life, further inquiry into the methods indicated in these citations were scarcely idoneous or germane to the present inquiry.

We now pass to the second fallacy heretofore stated, namely, that the robust health and active old age of the Indians is due to their system of medical practice. As a matter of fact, they preserve their strength and survive to long years not because of the prayers, the smokes, and the

rattlings of the medicine men in their behalf, but rather in spite of them. The continued strength of the Indians is a concomitant of their life out of doors, where the mode of life demands every day the fullest possible exercise of the muscular tissue. As with other nomads, the weak point of the race, and at the same time the strong point of the individual, comes in infancy. Only the fittest survive, those who have the stamina to bear the hardships that are yet to come. Infant mortality is high; the feeble drop out at the beginning of the race, and the survivors are such as are equipped by nature to survive, a case of the survival of the fittest. The Indian who endures the hardships of the infant period can not be readily killed by the medicine man in later life. Inasmuch as the health of the Indian is dependent, with the very least assistance of human observation, upon the *vis medicatrix naturæ*, there is no reason to expect that the very ignorant system of Indian therapeutics can have any solid value for the white man, who is the heir of ages of medicine and anatomy.

Reserving the third and final fallacy, it is convenient at this point to direct our attention to the very few remedial agents which we have derived from the Indians, or which we use in common with our aboriginal predecessors on the American continent. In a former paragraph we have stated that these number but twenty-six, the computation being based on the statements of the pharmacopeia, that monument of research which must stand for us as the court of last resort. Of this number only eight stand as officinal, eighteen being relegated to the appendix of that work.

The eight officinal agents are the following: Cascara sagrada, geranium, hamamelis virginica, hydrastis, lobelia, sambucus, spigelia, and yerba santa (Eriodictyon glutinosum). The most casual inspection of this list will show that only one of these remedies of the Indians has taken any important position with us, namely, that which alphabetically appears first on the list, cascara sagrada.

Cascara sagrada.—This is the dried bark of *rhamnus purshiana de Candolle*, a small tree of twenty feet or less which occurs in California north of the bay of San Francisco and thence northward into British Columbia, along the coastal elevations. It was introduced to medical science in the exhaustive treatise contained in the "Pharmacology of the Newer Materia Medica," and promptly won its way to recognition in the pharmacopeias both of this country and Great Britain. It has been found invaluable as a mild and constitutional purgative. The early settlers of California, after the discovery of gold in that State, found the Indians of the Hoopa Valley in particular, where it grows abundantly, employing old bark for this purpose in cold infusions. The characteristic value of different samples of the scientifically prepared extract is readily determined by the physiological assay test.

Geranium maculatum.—The part employed is the rhizome. It is cited as one of our best indigenous astringents, and may be employed for all the purposes for which these medicines are applicable. The absence of unpleasant taste and of other offensive qualities renders it particularly serviceable in the case of infants and of persons of very delicate stomach. Diarrhea, chronic dysentery, cholera infantum in the latter stages, and the various hemorrhages, are the forms of disease in which it is most commonly used and with greatest advantage, but care should be taken before it is administered that the condition of the system and of the part affected is such as not to contraindicate the use of astringents. As an application to indolent ulcers, an injection in gleet and leucorrhea, and a gargle in relaxation of the uvula and aphthous ulcerations of the throat, it answers the same purpose as kino, catechu, and other medicines of the same class. It is a popular domestic remedy in various parts of the United States, and is said to be employed by the Indians.

Hamamelis cortex.—The part employed is the dried bark of hamamelis virginiana linne. Witch hazel is an indigenous shrub, from five to fifteen feet high, growing in almost all sections of the United States, usually on hills or stony places, and often on the banks of streams. The bark of the witch hazel is said to have first attracted attention on account of its use by the North American Indians as a sedative application to external inflammations. Of late years professional attention has been very strongly directed to the remedy on account of the enormous sale of a much-vaunted proprietary remedy said to be made by distilling the bark with very dilute alcohol (six per cent.), and used externally for sprains and bruises, and internally for most of the diseases to which flesh is heir. The pecuniary success of this remedy probably has depended in small part upon the virtues of the witch hazel, which seems to possess no active physiological properties.

Hydrastis (golden seal).—The part employed is the rhizome and roots of hydrastis canadensis linne. This is a small, herbaceous, perennial plant, with a thick, fleshy, yellow rhizome, from which numerous long roots arise, and an erect, simple, pubescent stem, from six inches to a foot in height. The plant grows in moist, rich woodlands in most parts of the United States, but abundantly in the North and West. The root is the part used. The Indians employed it for staining and dyeing yellow. As a local remedy, hydrastis has a remarkable effect upon mucous membranes.

Lobelia.—The leaves and tops of lobelia inflata linne, collected after a portion of the capsules have become inflated, are the parts employed. This species of lobelia, often called Indian tobacco, is an annual or biennial indigenous plant, usually a foot or more in height, with a fibrous root, and a solitary, erect, angular, very hairy stem, much branched about midway, but rising considerably above the summit of the highest branches. It is a very common weed, growing on the roadsides and in neglected fields throughout the United

States and Canada. It is said to have been used as a medicine by the aborigines of America. The leaves or capsules, chewed for a short time, occasion giddiness, headache, general tremors, and ultimately nausea and vomiting. As an emetic, lobelia should never be used; at present it is rarely employed at all except in spasmodic asthma, the paroxysms of which it often greatly mitigates and sometimes wholly relieves, even when not given in doses sufficiently large to vomit. It has been used also in catarrh, croup, pertussis, and other laryngeal and pectoral affections, but is chiefly valuable where there is bronchial spasm; it must always be employed with caution.

Sambucus (*elder*).—Part used, the flowers of sambucus canadensis linne, which are gently excitant and sudorific, but are seldom used. The fruits of the California species, sambucus glauca and sambucus racemosa, are said to be used as food by the Indians.

Spigelia (*pinkroot*).—Part used, the rhizome and rootlets of spigelia marilandica linne. The Carolina pink is an herbaceous perennial plant. It is generally considered among the most powerful anthelmintics. In the ordinary dose it usually produces little sensible effect on the system; more largely given it acts as a cathartic, though unequal and uncertain in its operation; in overdoses it is said to cause vertigo, dimness of vision, dilated pupils, spasms of the facial muscles and of the eyelids, and even general convulsions. The danger from its employment can not be great, as it is in very general use in the United States, in both regular and domestic practice, and we never hear at present of serious consequences. The vermifuge properties of spigelia were first learned from the Cherokee Indians in South Carolina.

Yerba santa (*eriodictyon glutinosum*).—Part used, the leaves of eriodictyon glutinosum bentham. It is a low shrub from California to New Mexico, and grows upon dry hills abundantly in California. It has long been used in California as a bitter tonic, and also as a stimulant balsamic expecto-

rant. There is considerable testimony to its usefulness in asthma, chronic bronchitis, and allied conditions, also in chronic inflammation of the genito-urinary tract. In cases of asthma it is often used by smoking. For the more complete discussion of its therapeutic value the investigator is referred to the Pharmacology of the Newer Materia Medica (*sub voce*), in which it was first introduced to science.

The preceding are the officinal remedies which in whole or in part we owe to the Indians. In similar detail we now pass to the other remedial agents, which have not yet received the full recognition of the pharmacopeia.

Arbor Vitæ (*Thuja occidentalis*).—In the pharmacopeia prior to 1890 this was regarded as officinal. The leaves and small twigs are the parts used. They have a strong, agreeable, and balsamic odor, especially when rubbed. A salve made of the leaves used to be a remedy employed by the Indians for the relief of rheumatism. For a more scientific discussion of the properties of this agent the pharmacology of the Newer Materia Medica is suggested.

Acerates decumbens.—This plant, which grows in New Mexico, is stated by Dr. William J. Wilson, of the army, to be used as a specific in snake bite.

Euphorbia.—Dr. B. J. D. Irwin, United States Army, heard much in Arizona and New Mexico of the efficacy among the native population of a certain plant called by them "gollindrinera" as an antidote to the poison of serpents, and was induced to make trials of it which convinced him that its reputation was merited.

Guaco.—Three or four species of aristolochia are used in parts of Mexico as antidotes for snake poison, under the name of guaco. The natives when employing it as a counter poison apply the bruised leaves and expressed juice to the bite and at the same time drink of the infusion.

Kalmia latifolia (*mountain laurel*).—Dr. Barton says in his "Collections" that the Indians sometimes use a decoction of the leaves to destroy themselves.

Mata.—This name is given in New Mexico to an herb much used in that region as an addition to tobacco in smoking. It is said when burning to have an odor like that of the tonka bean, and when smoked with tobacco to correct the extremely disagreeable smell imparted by this to the clothing and apartments.

Mitchella repens (*checkerberry*).—The whole plant is supposed to possess remedial properties, and is said to be employed in decoction by the Indian squaws to facilitate parturition. It appears to be diuretic, tonic, and astringent.

Petroleum.—Before the economical discovery of the crude and refined oil, petroleum was collected in small quantities on the border of Seneca Lake and was used under the name of Seneca or Indian oil.

Spiraea tomentosa (*hackmatack*).—This shrub is tonic and astringent. It is said to have been employed by the aborigines.

Tephrosia virginiana (*wild pea*).—Tephrosia virginiana (Persh) grows in most parts of the United States. It is a foot or two high, with pubescent stems or leaves and handsome terminal flowers. The roots, which are slender, long, and matted, are tonic and aperient, and are said to have been used by the Indians as a vermifuge, given in the form of a decoction.

For detailed information as to the seven succeeding agents, we have to acknowledge our indebtedness to the "Pharmacology of the Newer Materia Medica," that eminently scientific publication which in so many valuable particulars has been found ancillary to the pharmacopeia.

Anhalonium lewinii (*mescal button*).—This cactus product has been long in use by the Comanche and other tribes of the arid region of Texas and the Territory. The aboriginal use is confined to the intoxication derived from its smoke when slowly consumed and inhaled under blankets or in the confines of the sweat lodge. It is reported as producing a

complete derangement of the color sense, the person therewith intoxicated perceiving the most marvelous dreams of color, entirely dissociated from recognizable form. Medicinally it has been proposed as a cardiac tonic and an adjuvant to digitalis.

Bamboo brier (*smilax pseudo-china*).—The part employed is the rhizome. Its properties are alterative and tonic. It is preferred by many physicians to the imported sarsaparillas, proving more efficacious in its alterative influence, especially in constitutional syphilis. Among the Indians and our people it has been extensively used as an antisyphilitic remedy, and is to-day the most popular indigenous root for the above purposes. It is used in the form of a decoction and taken *ad libitum*.

Damiana (*Turnera diffusa*).—The use of damiana as a domestic remedy for invigorating the nervous system dates back from a distant period in its home, Western Mexico. Indian hunters were accustomed in times of great drouth and after wearisome journeys to refresh exhausted nature and prepare themselves for further fatigue by indulging in copious draughts of a decoction of this shrub. The properties of damiana did not long remain a secret, and soon became familiar to the rest of the inhabitants of Mexico, and rose indeed to such high repute that the people began at last to place more faith in this plant than in physicians themselves, going even so far as to use it as a remedy for all diseases. The manner in which the natives prepared it was quite simple. They macerated the leaves in water, added sugar to the preparation, and thus obtained a drink so agreeable that it was taken instead of tea or coffee, and was intended, at the same time, as a measure of precaution against any possible attacks of disease. As early as 1699 it was learned through the chronicles of the Spanish missionary, Juan Maria de Salvatierra, that damiana was used by the natives of Mexico as a remedy in impotency and to empower them to perform the sexual act.

Echinacea angustifolia (*black Sampson*).—It is stated to be a valuable remedy in the treatment of hydrophobia, blood poisoning, and snake bites—being the remedy most in favor among the Sioux Indians for the latter purpose. The fresh root is stated to be used by being scraped and administered to the person bitten. It produces an excessive flow of saliva and perspiration.

Jatropha macrorhiza, *Bentham*.—The seeds and roots of this plant have been long in use by the Mexicans as a household remedy, in much the same indications that castor oil is with us.

Manzanita (*arctostaphylos glauca*, *Lindl*).—Part employed, the leaves in fluid extract. In the spring it bears a pinkish-white blossom in clusters, which later on in the season are replaced by round red berries about half an inch in diameter, of a pleasant acidulous taste, being often eaten by the California aborigines as well as by the grizzly bear. The leaves are the portion of the plant used in medicine. When chewed they excite to a marked degree the flow of saliva, and give a particularly strong, astringent, slightly bitter taste, afterwards sweetish. Manzanita is said to be an astringent tonic with special action on the urinary organs, and has been recommended as a valuable agent in the treatment of gleet, vesical catarrh, incontinence of urine, etc.

Yerba buena (*Micromeria douglasii*, *Bentham*).—This drug has long been known to the natives of California as possessing remedial virtues. It is a grateful aromatic stimulant, and is useful as a stomach carminative and anthelmintic. It allays nausea and spasmodic pains in the stomach and bowels, and reduces the force and frequency of the pulse and fevers, and is found to be well adapted to the expulsion of round worms in children. It is administered in the form of tea or infusion, drank while hot, covering the patient immediately afterward with bedclothes. The historical student will recognize in the popular Spanish name,

yerba buena, or good herb, the original name of the metropolis of the Pacific Coast, which was later changed to San Francisco.

Yerba mansa (houttuynia Californica, Benth. and Hook).—The part employed is the root. Its properties are tonic, astringent, and stimulant. It is employed by the natives of Santa Barbara and San Diego in Alta California in malarial fever, and there is good evidence that it is valuable, particularly in the chronic varieties of malarial infection. In diarrhea and dysentery it is a remedy of pronounced value.

Before entering upon the preceding consideration of the very few remedial agents which we owe in ethical medicine, as reported by the pharmacopeia, to the investigations of our savage predecessors upon this continent, we reserved consideration of the third fallacy in argument. At this concluding point it may be found advisable to recite in brief the three fallacies in toto. They are:

(1) The Medicine Man is not a physician.

(2) The good health of the Indian exists in spite of, not by reason of, any rational system of aboriginal medication.

(3) The modern so-called Indian remedies are not derived from any real Indian practice, as are the two dozen drugs just cited.

That the so-called Indian remedies of our present-day quacks have nothing whatever to do with our aboriginal predecessors scarcely needs argument. For several years a number of our pharmaceutical and medical journals have been publishing analyses of the several nostrums, among which appear in large numbers the Indian remedies. These for the most part appear under various tribal names which are particularly supposed to attract the interest of the population at large, yet in most cases the only knowledge which the laity may have of the tribe mentioned resolves itself into a sort of recollection that the tribe in particular referred to exercised at one time a certain aptitude in the surgical operation of removing the scalp-lock, together with the sub-

jacent tissue to which the hair was attached in life. Not only would it be invidious to discuss by name the several Indian remedies of modern quackery, it would even be an unnecessary task. Grouping the results of such examinations as have been conducted by the writer and others, it is sufficient to note that they are compounded in accordance with the "shotgun" prescriptions of blood purifiers and general tonics, and for the most part they are crowded with mercurials and iodides, despite their common protestation that they are purely vegetable and contain no minerals, the latter being a statement that seems to convey some meaning to the ignorant laity. The person who uses the so-called Indian remedy on the advice of the long-haired mountebank at the tail of a cart under the smoky flame of the gasoline torch might be expected to have the same degree of confidence in the scalping-knife as a hair restorer. In the latter case, at least, his troubles would be fewer.

XX. THE YOUNG PHYSICIAN.

By EMIL AMBERG, M. D.,
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"Conscience is the law of laws."—Lamartine.

The Present Medical Conditions are Unhealthy.—The medical literature of our age bears witness that clouds are gathering on the professional horizon which must create in every physician gloomy views about the future. It is natural, as proved by history, that the interests of individuals, though they may be strictly within the law, will sometimes place a whole class of men in a position which can not be recognized as healthy and in accord with the general welfare even when viewed from a moral standpoint by the individual members of the privileged class themselves. History shows that under these circumstances the moral law exerts its right, with irresistible power, and declares unlawful to-day

what has been regarded as lawful yesterday. More and more the principle is recognized that the individual who forfeits his right forfeits the right, which principle has been so excellently expounded by the great teacher Jehring.

The status of the medical profession in our country of to-day will, I hope, in the future be understood and excused only by virtue of the historical method. There is nobody more proud than I of the illustrious achievements of our own medical men; but, unfortunately, we have to-day an oligarchic state of affairs. I am speaking of the great majority, and try to compare in my mind the medical conditions of to-day with the state of affairs which could exist if medical matters were arranged according to the intellectual and moral standard of well-educated and conscientious American citizens. It is not my intention to take up your time with generalities; I shall try to remind you of a few facts known to all of us which show that it requires only some good will to make great advancement. I can not demonstrate this fact better than by speaking of the young physician who starts to practice medicine.

The Young Physician Confronted with Conditions Caused by the Overabundance of Medical Colleges.—After the young man has received his diploma he may or may not become an interne in a hospital, or he may travel, in order to add to his knowledge and skill. After a little time he will settle down to practice, or, rather, he will try to do so. Wherever he may look for a location in our country he will immediately be confronted with the fact that there is very little room for him. I am speaking of general, and not of exceptional circumstances. That there exists an illegitimate over-production of physicians in our country only ignorance can deny. Who is responsible for this state of affairs? We read, in the Journal of the American Medical Association of July 27th, page 270, in part:

"Our 160 medical colleges, however, turn out annually a crop of nearly 6,000 graduates, or over 2,000 more than can thus be provided for.

"It is certain that the multiplication of doctor factories has gone far enough in this country, though, as yet, it does not seem to have been checked."

A young man entering a medical college should have proved by his record that he is able to undergo the hard study of medicine. Is this always the case? Dr. Henry Beates (see New York Medical Journal of August 10, 1901, page 200) says:

"It is the commercialism of the medical schools that is the cause of so many rejections. The papers of this examination prove clearly that the medical colleges continue to admit students who are utterly illiterate. The students can not pass even the simplest rudimentary examination, and to them medicine is a study entirely beyond comprehension. Just so long as these colleges admit men of little or no preliminary education there must be a large percentage of rejections when they take the Board examinations. I wish to say, emphatically, that the granting by a college of diplomas to such men is a fraud."

Medical Colleges Responsible to the Public and to the Physicians.—The college faculty, to some extent, is morally responsible in two ways: 1. To the community. 2. To the student. The community expects a medical school of to-day to furnish only physicians able to fulfill their duties properly.

The student who places his whole future, practically, in the hands of the faculty must expect to be able to make a decent living afterward. The medical schools of to-day have a great influence in this respect.

In the announcement of a medical college for the session 1901-1902 we read, in part: "Nearly all the medical colleges in the United States are now associated in four separate organizations for the purpose of raising the standard of medical education. One of these, the Association of American Medical Colleges, embraces the majority of the regular medical schools in good standing, and while it possesses no licensing power, it exercises, nevertheless, a potent influence upon the future career of graduates."

Until we see still more of the results, we must keep in mind what the committee on organization of the American Medical Association said in their preliminary report (Journal of the American Medical Association, May 25, 1901, page 1441): "The physicians connected with the medical colleges organized some time ago a medical college association, and this body has done much good, but it is realized by those connected with it that it has failed in some of the important measures it undertook to carry out."

The mere fact that a medical college belongs to the Association of American Medical Colleges is not a proof of its sufficiency. The medical boards can not conscientiously recognize the College Association. This could only be the case if a permanent joint committee would continually inspect the colleges. On the other hand, we should keep in mind what Dr. Albert R. Baker, ex-president of the College Association, says: "As long as we have forty or fifty examining boards, many members of which are appointed solely as reward for political service, there will be need of watchful oversight."

We know that the medical faculties of our country, who control the output of the material, have been so thoughtless in their conduct that the young man finds little room for work. It is easily understood that great harm is done thereby in various ways. The young physician's ability is diminished through lack of exercise. Undoubtedly he loses some of his training, and the community is a direct sufferer, because the services rendered by the young man can not be so good now that he has become rusty. That science is a loser need not be mentioned. We all know how discouraged these young men become and to what means they take recourse to keep themselves above water. The ideal side of our calling is lost sight of under such circumstances. The medical autocrats, the college professors, the *beati possidentes*, thrive anyway, but the young doctor almost starves. It would be well to establish living insurance companies for young physicians as we have life insurance companies.

Dr. Philbrick, in an article in the Journal of the American Medical Association of June 15, 1901, says, in part:

"Medical colleges exist far in excess of any public need. Like the country store which doles out inferior wares at every cross-road, a so-called "Medical College" is found in almost every town of generous size; and to obtain a medical degree is within the possibility, intellectual and financial, of any youth, however lacking in mental and moral fitness. In the majority of cases they possess few facilities for demonstration, are located in towns where there is not a sufficient number of dependants to furnish requisite clinical material, and generally have as instructors men of mediocre or less ability.

"Professional welfare is not a desideratum in the founding of most medical colleges, they being merely reflectors of personal ambition.

"So irrationally have medical schools been established in our large cities that it is recognized by sociologists and charity workers as one of the most potent causes at work to undermine the sense of economic independence and self-respect in the community. The clinics must be filled; hence the ability of those seeking relief to pay can not be questioned. Not alone are the laity pauperized; the young practitioner walks long and wearily in the borderland between inanition and starvation. My statements are facts, not fancy."

Dr. A. N. Ellis, in the Cincinnati Lancet-Clinic of August 24, 1901, says, in part:

"I have heard a great deal about there always being room at the top. I don't believe a word of it. I know lots of young men of skill, learning, and industry in the city of Cincinnati who do not make a decent living, and why? Because the supply exceeds the demand."

It is imperative that steps be taken by the people and by the well-meaning members of the profession to remedy the abuses by early and energetic action.

Reciprocity and Uniform Medical Legislation.—The communities are beginning to apply vigorous remedies through the medical boards. Only recently the importance of Medi-

cal Examination Boards has become more recognized. They are now pretty well established in their own divisions, and by the universally demanded reciprocity between them the requirements will become more stringent until uniformity is reached. Reciprocity is not dependent upon the will of the boards, because the boards are only the executors of the will of the people. As soon as it is understood that the life of a citizen in one political division is worth just as much as the life of a citizen in another, and as soon as the very simple deductions from this principle are made by the people who are most concerned, a change must come. It is only natural that divisions which are medically equally strong will form groups. Reciprocity furnishes the means of raising the standard of a medical education, of making it uniform, and of doing away with illegitimate overcrowding. Overcrowding in itself is at present beyond our control, but the fact should be emphasized that we should and can prevent illegitimate and fraudulent overcrowding. What a deplorable law exists even in Massachusetts, where a man can be admitted to examination for the State license who has not graduated from a medical college! It will be absolutely necessary that in the future in nearly all political divisions the State Board of Health and the State Examining Boards form two distinct bodies, and that, as a rule, no physician shall hold office in both boards simultaneously.

The question of reciprocity and uniform medical legislation is inseparably connected with the national welfare, and will stand so before the people and the medical profession until it is solved. The approval of reciprocity and uniformity by almost every intelligent physician must be acknowledged with satisfaction.

It is the young physician of to-day who is necessarily the most interested in the question of uniformity, because, according to the laws of nature, the future belongs to him. The gray-haired members of our profession, however, who still possess young hearts, will be with us.

Medical Schools Must Become State Institutions.—The tyranny exercised by so many medical schools over the medical profession must first be broken by united efforts before we can speak of the independence of the medical profession in the United States. Paternalism of the worst kind must be overcome. The medical profession is strong enough to act; we should not be intimidated by remarks to the contrary. The people will stand on our side. If there exists the necessity for a combination in the form of a union, it should be a combination of physicians against the medical schools of a low standard. The standard approved of by the Association of American Medical Colleges can not be accepted as sufficiently high. Medical schools should be State institutions, and special privileges should not be enjoyed by private medical school corporations. Institutions of the character of medical schools are too important a factor in the constitution of a nation that any community can afford to give the control over the same to private parties, however trustworthy they may be. No State, for example, would dare nowadays to entrust to a corporation the right to form an army and to carry on a war. The sound mind of the people I hope will in time remedy this abuse of a personal liberty in a free country. There does not exist the least doubt in my mind that private medical schools before long will not be tolerated. So far as the profession is concerned, we may say that the Declaration of Independence of the medical profession has not yet been pronounced. The most important part of it will read: "Medical schools shall be State institutions."

If it should be the case that the American Medical Association can not act, I think it would be advisable that the independent members of the medical profession form an association of their own. However, I hope this step will not be necessary.

Many of the medical schools have acted to their pupils, and later physicians, like stock companies which have

watered their stock. They did so by turning out many inefficient men, increasing the number of so-called physicians, who, rather unscrupulous in their methods, help to make the medical profession of to-day appear in the eyes of the public as resembling a diluted and rather unreliable mixture. That such a proceeding is detrimental in every respect need not be dwelt upon. It lowers the professional standing, it prostitutes science, and introduces a commercial spirit which no code of ethics can successfully combat. The code of ethics has become almost powerless nowadays.

Commercialism and Advertising.—What does the young physician do in order to succeed in his chosen profession? If he has means enough to spend two to six years in his office in practically solitary confinement, he may expect to succeed. Others travel for pharmaceutical and other concerns and give up their professional career. The young man who sticks to his calling is sometimes obliged to call the attention of the public to his existence as a medical man by resorting to ways and means which are entirely unprofessional.

Only recently we read that a young physician in Michigan accepted the position as community doctor for 240 families at the rate of fifty cents a month per family. If such a plan is carried out in other places and under present conditions we may soon expect to hear that other physicians will take care of a certain number of patients if their office rent, board, and laundry bills are paid and if they receive some pocket money. Many physicians nowadays will be glad to work under such, or worse, conditions, and I do not blame them. That the public will be the ultimate sufferer if such a procedure becomes popular need not be mentioned. We know that in a foreign country just such a state of affairs has led to much trouble.

A peculiar movement was started in one city when an association was intended to be formed by the aid of which some thought thumbscrews could be put on the patients.

It had been entirely forgotten that the overcrowding of the medical profession is the cause of so many evils, which can not be corrected by squeezing the public in any such manner. It requires, however, action, to go at the root of the evil. Renan says: "In morals, like in art, talking is nothing, doing is everything."

So much is said about advertising, especially about the advertising of one's specialty. How eager are some specialists to prevent a young man from becoming known as a specialist, and yet, time and again, do not the same men have the attention of the public called to their specific calling in college announcements, hospital reports, and in other ways? Sometimes a great indignation is expressed when a physician's name appears in the daily press, and yet often we are obliged to think that most physicians decry the appearance in the daily papers of a physician's name only if that name does not happen to be their own.

Furthermore; does there exist a commercialism more pronounced than that exhibited by some oculists who procure eyeglasses for their patients and then sell to them at an advanced price? Such a procedure works harm in both ways: First, it degrades the profession, and second, it is deceiving by making the world believe that the specialty is so very successful in itself, whereas it seems to be so sometimes only by taking refuge in commercialism. I do not blame the individual oculist; I only want to show what fruit grows on the tree of overproduction. It has gone so far that nowadays we frequently must not speak so much of the "survival of the fittest," but of the "survival of the shrewdest."

No one can learn to master a specialty in a few weeks. It should be required that a man, before he is allowed to practice a specialty and make such known, should give proper evidence either to the State Board or to some recognized medical society that he is entitled to it. It would be of great interest to learn how the many eye, ear, nose, and

throat specialists acquired their knowledge and received their training, especially in the latter-mentioned specialties. It is absolutely impossible that these specialties can be learned out of books, and it is imperative that thorough and personal instruction is received in these branches like in any other, in order that the mistakes which experience learned to avoid are not made over again. This can only be reached by actual training. That we have, in this respect, room for much improvement must be admitted.

How frequently has the attention of the medical profession been called to the lack of respect exhibited in the court-room when a physician is called upon to give expert testimony, and how often has it been admitted that this lack of respect is merited to a great extent? A lack of confidence in the medical profession is amply shown by the fact, as Dr. McClintock remarks, that drugs were purchased after physicians' prescriptions to the amount of ten million dollars within a year, whereas one hundred and sixty million dollars' worth were bought directly by the public.

Our Hope rests with the Reorganized American Medical Association.—The laity and the medical profession are beginning to realize that modern medicine should be based on solid ground, that it must be studied systematically, and that it requires the whole energy, perseverance, and time of its well-trained exponents. Only by devoting practically his whole time to professional work will the average physician be true to his calling. Our possibilities are limited according to the nature of men and things. It is inhuman to limit them still more by unprofessional methods.

The field of medicine becomes larger every day. Thorough training in physiology and pathology becomes more and more recognized as indispensable for correct and independent thinking in medicine. The means which lead to a differential diagnosis become more exact. Preventive medicine has become the password of our time. The methods of treatment embrace means hitherto only little

employed. A great familiarity with psychology, hydrotherapy, massage, and gymnastics, and their proper application, will quickly diminish the number of faith-healers and osteopaths and strengthen the confidence of the public in the profession. Thorough training in a professed specialty will more and more be insisted upon. May the young physician quickly adapt himself to modern demands. He is more free to act because he is not so much hampered by tradition and old associations.

At present the future of American medicine lies in the hands of the House of Delegates of the American Medical Association. Great responsibilities are placed upon the shoulders of the delegates, who are confronted with serious problems. The endorsement of the plan of reorganization of the American Medical Association, at the meeting at St. Paul, awakens great hopes. Medical education, medical legislation, and reciprocity have been mentioned as essential parts of the work before the new body. May the delegates find a solution in the near future and may they feel sure of the assistance and coöperation of every clear-minded and well-meaning physician in this our great country.

XXI. THE SURGERY OF PULMONARY ABSCESS, GANGRENE, AND BRONCHIECTASIS FOLLOWING PNEUMONIA.

By DANIEL N. EISENDRATH, M. D.,
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We can divide the history of pulmonary surgery into two periods. The first begins at the time of Hippocrates, and ends about thirty years ago. The most active part began two hundred years ago, when Baglivi opened an abscess following a stab wound of the lung. A number of reports of cases of abscess treated by surgical intervention appeared during this time. The second period dates from the time

that Mosler, in 1873, attempted to cure pulmonary abscesses by intraparenchymatous injections of antiseptics. Gluck, Schmidt, and Biondi (1882) showed by animal experiments that extensive pneumectomies were well borne. In 1882 Bull reported 32 cases of abscess which had been healed by operation. From that time to the present the subject has received a great deal of attention and a large number of valuable monographs have appeared, as well as the reports of individual cases. The field has been extended so that it now includes the treatment of abscess, gangrene, echinococcus, neoplasms, removal of foreign bodies, actinomycosis, and the drainage of bronchiectatic and tubercular cavities. Those who deserve especial mention in this field are Park, Tuffier, Murphy, Quincke, Godlee, and Runeberg. Quincke deserves great credit for calling attention to the vast number of cases of chronic pulmonary suppuration which have been benefited by operative intervention.

It would be impossible for me to take up all of the various branches of this already extensive subject, so that I have confined this paper (in order to bring out the chief points in a particularly instructive case which occurred in my practice during the past year) to the discussion of pulmonary abscess and gangrene and bronchiectasis occurring after pneumonia. I have purposely excluded the consideration of cases of any of these lesions due to any other cause. This being the first effort to classify the cases according to the etiology, it has necessitated an immense amount of tedious search into the original records of cases.

In regard to the etiology, all authors agree that abscess is far more frequent than gangrene as a sequence of ordinary croupous pneumonia, but that the opposite holds true for influenza. Laennec has stated that abscess following pneumonia is very rare. Sello, in 750 cases of fibrinous pneumonia, found abscess 11 times, or 1 in .5 per cent. Aufrecht, in 253 cases, found it in 3, or 1.2, or in approximately one thousand cases about 1.4 per cent.

In regard to the frequency of gangrene, Grisowle found no cases of gangrene in 305 cases of pneumonia, and in 70 cases of gangrene which he collected he found that pneumonia preceded the gangrene only five times. A. Fraenkel found that 7.5 of all cases of influenzal pneumonia terminated in gangrene. Sello, in 750 cases of croupous pneumonia, found it only three times. Aufrecht, in 1,501 cases, never observed it.

In regard to the frequency of bronchiectasis following pneumonia, there are no statistics, so far as I can learn.

The organisms concerned in abscess formation are the pneumococcus, the colon bacillus, the influenza bacillus, and the Friedlander pneumonia organism. It is believed that some of these can be directly the cause of gangrene as well as abscess formation. Gangrene of the lung may be the result of aspiration of a portion of the contents of a putrid bronchiectatic cavity, as was probably the case in my own patient. Some authors have described epidemics of pulmonary gangrene in which it would seem as though there were a separate organism concerned, but there are no reliable facts in regard to this. Pulmonary gangrene following pneumonia is especially apt to occur in diabetics, alcoholics, and in the insane.

With reference to the pathology, I will state briefly that abscess may be single or multiple, and that the same is true of gangrene. The latter may be circumscribed or diffuse. The walls of the cavities in the early stages are soft, but as the disease progresses they become firm, and this pathological factor is of the greatest value in determining the healing of pulmonary foci if attacked in a surgical manner in the early stages.

The bronchiectases may be divided into the cylindrical and sacculated, the former being usually in the middle of the finest bronchi. The sacculated generally arise at the expense of the lung. The bronchus itself may be closed. It may join adjacent ones so as to occupy the entire lung. They are seldom associated with tuberculosis. They are accompanied

quite early by deformities of the thorax and clubbed fingers, and are frequently associated with abscesses as well as with gangrene. The great danger in pulmonary gangrene is the frequency with which it is followed by secondary cerebral abscesses and with putrid bronchitis and catarrhal pneumonia.

Before taking up the discussion of the symptoms and diagnosis, I would like to call attention to the fact that in this paper I have followed as closely as possible the classification proposed by Quincke of acute simple abscesses, chronic simple abscesses, with or without bronchiectases, acute gangrenous abscesses, and chronic putrid abscesses with bronchiectases. This seems the most logical division of the subject which has been proposed hitherto.

Symptoms.—The history of pulmonary abscess is frequently the following: A patient who has had pneumonia, for example, of the lower lobe will have his crisis, the physical signs begin to clear up, the temperature drops, when suddenly the temperature goes up again, becomes of a remittent type, and the sputum becomes more purulent. There may be a distressing cough, accompanied by the expectoration of pus in large quantities. Some elastic fibers may be present, but are rare. There are often paroxysms of coughing, with expectoration of several ounces to a cupful of pus. If the abscess cavities do not communicate with a bronchus, there is but little expectoration. There is in all cases emaciation, loss of appetite, and a rapid decline in strength. If the abscess becomes chronic, there may be recurrent attacks of fever, with a great deal of expectoration. Physical examination is rather disappointing; there are few cases in which there are cavity signs present, either due to an indirect manner in which the abscess communicates with a bronchus, or to its not opening into one at all. The pulmonary lesions following pneumonia are most frequently in the lower lobes, and this is of some aid. There are no typical physical signs, owing to the fact that the cavities (be they due to abscess,

gangrene, or bronchiectasis) may be near the surface or quite deeply situated, and may or may not communicate with a bronchus. Dullness, decreased respiratory murmur, vocal resonance, and fremitus are present in the majority of cases, but we may have bronchial breathing. The most reliable sign is the presence of rales, large moist ones, not infrequently metallic in character. Another striking feature is the variability of the physical signs, once dullness, then tympany at the same spot. A pus cavity surrounded by aerated lung tissue and not communicating with a bronchus gives no auscultatory phenomena. Clubbed fingers develop quite early, as do also pressure symptoms on the heart, liver, and spleen. If, after a pneumonia, the fever either does not disappear, or begins again a few days after a crisis, and the sputum and breath become fetid and divides itself into the characteristic three layers, gangrene must be suspected. This, as Fraenkel has shown, is a frequent sequel of influenza pneumonia. In the sputum of gangrene one can usually find elastic fibers. In bronchiectasis following pneumonia the sputum may be fetid at times, but the odor is not so penetrating and there are no elastic fibers. The physical signs of both gangrene and bronchiectasis are most frequently the same as those of abscess. In a patient with bronchiectasis there is usually a history of long-continued expectoration with sudden expectoration of large quantities of pus. This, however, is not characteristic, for the same may be true of chronic simple abscess. There is said to be more mucus in the sputum of a bronchiectasis, but if there are cavities in the lung tissue due to ulcerations of bronchiectasis there may be just as much pus as from a simple abscess, and if there is associated gangrene, just as much fetor as in a gangrene.

The frequency of hemoptysis in cases of gangrenous process is due to the fact that the vessels are more apt to pass freely through the cavity, owing to the more rapid destruction of tissue.

Diagnosis.—From what has just been stated, we can say that the history is of the greatest aid in making a diagnosis, especially if pneumonia has immediately preceded the onset of abscess or gangrene symptoms. Both are frequent after influenza pneumonia. Gangrene is also quite frequent after pneumonia in alcoholics, diabetics, and in the insane. The examination of the sputum is also of great value in making a diagnosis. In abscess it is purulent, at times of a chocolate color, and occasionally contains elastic fibers. In gangrene it is more and more offensive as the case progresses. It separates on standing into three layers and contains elastic fibers, which the sputum of putrid bronchitis, with which it may be confounded, does not.

In bronchiectasis the sputum is at first odorless, but usually becomes foul but not fetid from the stagnant pus. In abscess the cough is often very frequent, and the amount of expectoration raised each time is small, while in bronchiectasis it is large and the cough infrequent. It is much easier to make a diagnosis of the nature of a lesion than its seat. Exploratory puncture is both dangerous and unreliable. Cases have been reported of fatal hemorrhage (Israel) following it, and there is great danger of infecting a healthy pleural cavity. It is also difficult whether the pus is intra- or extra-pulmonary.

There are no absolutely reliable physical signs to assist in localization of the process. The frequency of lesions in the lower lobes after pneumonia should suggest a most careful examination of these parts. If a lesion does not communicate with a bronchus it may give rise to no physical signs. On the other hand, the focus may be deeply situated and the intervening lung tissue obscure the physical signs. If cavity signs are present, they are of value, but not absolute. Impaired resonance, varying with tympany and the presence of moist rales, especially if coarse and metallic, are perhaps the most valuable signs. The more experience one has in abscess, gangrene, or bronchiectasis the more one is

convinced (especially if the cases are studied at autopsy) that the physical signs are misleading. The best clinicians make mistakes in determining the seat of lesion.

In addition to localizing the focus, we must try to ascertain its extent and whether there are foci elsewhere. It is almost impossible to differentiate an encapsulated empyema from an intra-pulmonary focus. General disturbances and fever are more characteristic for pulmonary lesions. Differentiation from tuberculosis can be made from the presence of tubercle bacilli in the sputum, and from the previous history greater diffusion of the tuberculosis and its greater frequency in the upper lobes. The physical signs may be the same for both.

In regard to the X-ray, much was hoped for, but the results have not been gratifying. Its value is only relative, and a shadow may be obtained in a thickened area quite distant from the actual seat. It is no certain guide to the focus, or whether there are one or several foci. Nevertheless, if it is possible, it should be used as a matter of routine, as it may be of some confirmatory value. In a recent article by Tuffier, he quotes eight cases which he examined with the X-ray. In five of these the pictures showed a distinct shadow at the seat of the focus. In one of the cases (bronchiectasis) the physical signs pointed to a cavity higher up than the shadow in the picture, but the latter proved to be correct, and he was obliged to operate at a lower point. In another case the shadow was a little higher than the focus. In three cases the radiograph was of no value. In one the shadow was in the lower, but the focus in the upper lobe. In a second a cavity the size of an orange gave no shadow. In a third the shadow of the heart obscured that of the lesion in the lung. Other authors report similar experiences, so that we may now regard it as an aid to diagnosis, but not as a final proof of the seat of the lesion.

Prognosis.—Medically treated the prognosis of metapneumonic pulmonary abscess is fair only. That a certain

number of cases do heal spontaneously there can no longer be any doubt. Cases of this kind have been frequently reported. Quincke speaks of three in his own clinic; Jacobson, of Berlin, reports six cases, of which four recovered spontaneously, one was operated and recovered, and one died. But in quite a large number of these cases of simple abscess the patients continue to expectorate pus and the condition becomes a chronic one, and is sooner or later complicated by the development of bronchiectases. In acute gangrene following pneumonia there are, as in simple abscess, some spontaneous recoveries, but the outlook is generally very grave, and those afflicted die soon after its onset of sepsis. In chronic non-putrid and putrid abscesses, with or without bronchiectases, the patients are doomed to a life of chronic invalidism, and gradually die of the effects of the chronic intoxication. Since the field of lung surgery has been invaded by surgeons, the effects of surgical interference have been so striking that the day will soon come when every case should be so treated. Even in acute abscess, if no improvement follows after three or four weeks of medical treatment, they should be referred to the surgeon. Especially in the cases following pneumonia is the prognosis good. In acute gangrene the cavity should be drained as soon as a diagnosis is made. In the chronic cases the prospect of recovery is not as good as in the acute, but the majority show a complete relief of symptoms, and many are cured, so as to be able to work again. The tendency to heal, either spontaneously or after operation, in acute cases is much greater than in chronic, owing to the fact that the surrounding parenchyma is still quite elastic and tends to close in upon the cavity. In the chronic cases, especially in bronchiectases, the walls are so rigid that all one can hope for is drainage. But even in these cases there are more and more reports being published in which either the bronchi were cauterized or that portion of the lung excised or a portion of the chest wall resected, so as to cause the cavity to close

by compression. An interesting case of the latter kind has been recently reported from Krause's clinic by Gross. The prognosis is better again in acute cases and in younger persons, because there is less intoxication and emaciation and better recuperative powers.

In order to demonstrate the value of surgical interference in pulmonary lesions following pneumonia I have collected the records of 93 cases following pneumonia, results of operative treatment of which are as follows:

Twenty-five cases of acute simple abscess—24 recovered, 1 improved, no deaths; 28 cases of acute gangrene—20 recovered, 2 improved, 6 died; 14 cases of chronic simple abscess with bronchiectasis—6 recovered, 3 improved, 5 died; 26 cases chronic putrid abscess with bronchiectasis—13 recovered, 4 improved, 9 died.

No similar effort having been made to classify the cases following pneumonia which were surgically treated, a comparison can not be made. The reports of every case of such lesions of the lung hitherto published were carefully searched and only those chosen in which there was a clear history of pneumonia preceding it. When the totals are computed as to percentage of recovery the result is quite striking, especially in the acuter cases.

Acute simple abscesses, 25 cases, 96 per cent. recovered, 4 per cent. improved; acute gangrenous abscess, 28 cases, 71.4 per cent. recovered, 7.2 per cent. improved, 21.4 per cent. died; chronic simple abscesses, 14 cases, 42.8 per cent. recovered, 21.4 per cent. improved, 35.8 per cent. died; chronic putrid abscesses with bronchiectases, 26 cases, 50 per cent. recovered, 15.3 per cent. improved, 34.7 per cent. died.

M. Recluse, in his address to the French Surgical Congress, 1895, gave statistics from various sources of 117 cases of all varieties operated on between 1879 and 1895, with 68 recoveries, a mortality of 42 per cent. His own statistics between 1885 and 1895 comprise 14 cases, with 12 recoveries, a mortality of less than 15 per cent.

Schultz collected 31 acute cases; of these 22 recovered, 73.3 per cent., and 8 died, 26.7 per cent. Of chronic cases he collected 51; of these 26 recovered, 51 per cent., 12 were improved, 23.5 per cent., and 13 died, 25.5 per cent. These were not cases following pneumonia exclusively, but from all causes.

Quincke collected 47 cases. Acute simple abscesses, 7 cases, 6 recovered, 1 died; acute gangrenous abscesses, 13 cases, 7 recovered, 6 died.

We thus see that in the acute cases (simple abscesses) there were 85 per cent. recoveries and 15 per cent. deaths; in the acute gangrenous cases there were 53 per cent. recoveries and 47 per cent. deaths.

Chronic simple abscesses and bronchiectases, 8 cases, 1 recovered, 5 improved, 2 died; chronic putrid abscesses and bronchiectases, 19 cases, 4 recovered, 7 improved, 8 died.

This makes the percentage in his chronic cases 12 per cent. recovery for the simple cases, 60 per cent. improved, and 24 per cent. died. For the chronic putrid abscesses and bronchiectases, the percentage of recovery is only 21 per cent., percentage of improvement 36 per cent., and 43 per cent. deaths.

In Tuffier's article he gives the following as the result of his observations:

Acute simple abscesses, 18 cases, 14 cures, 4 deaths; acute gangrenous abscesses following pneumonia, 54 cases, 39 cures, 15 deaths; chronic simple abscesses, 5 cases, 3 cures, 2 deaths; chronic putrid abscesses with bronchiectases, 4 cases, 1 cure, 3 deaths.

I do not think that Tuffier's statistics of acute gangrenous abscesses following pneumonia were all due to this cause, as in looking over many of the histories which he used I find that there is considerable doubt about the etiology, and have consequently not included such cases in my own list. The percentage of recovery thus would be, in acute simple abscesses, 77 per cent., of deaths 23 per cent. In the acute

gangrenous abscesses the percentage of recovery would be 70.9 per cent., and of deaths 29.1 per cent. In the chronic simple abscesses the percentage of recovery would be 60 per cent., of deaths 40 per cent. In the chronic putrid abscesses with bronchiectases the percentage of recovery is 25 per cent., of deaths 75 per cent.

When these statistics are compared with those which I have collected, the marked increase in percentage of recoveries both in the acute and chronic cases is very striking, and this is entirely due to the fact that the diagnosis has during the last ten years, and especially during the past five, been made at a much earlier stage than formerly, so that the indications are now clear that if a case of simple or gangrenous abscess of acute origin is diagnosed, and its localization determined as accurately as possible, there should be no delay in operating as soon as a reasonable time, say four weeks, has been given for a decrease in the amount of expectoration and fever. The period of time in which lung abscesses can heal spontaneously varies from three to ten weeks, and it seems as though a judgment in regard to their spontaneous healing could be formed in four to six weeks. By operating early we will constantly improve the already favorable statistics. In the chronic cases, like the one which I am about to report, the conditions for healing are far more unfavorable than in the acute, the lung changes are more likely to remain permanent, and in addition there has been a chronic intoxication with expectoration of large quantities of pus, emaciation, and in general an unfavorable condition for the success of operation. Hence the apparently large percentage of unsatisfactory results and deaths in such cases. But when we compare statistics at the present time with those of five and even ten years ago, the improvement can already be noted. The amount of relief to these patients far outweighs the risks of the operation.

In regard to the technique of pneumotomy, the most important point to decide is whether there are adhesions

present or not. The duration of the process, as Quincke has pointed out, is no criterion of the presence or absence of adhesions, and up to the present time, in spite of many rather ingenious devices and suggestions, there is no way of diagnosing their presence. It can, however, be stated, as I have ascertained from personal observation and from the statistics, that in fully 90 per cent. of all of the cases they are present. In the 25 acute simple cases which I collected they were present in 24; in the 28 acute gangrenous cases they were present in 24, or a little over 90 per cent. for the latter and 96 per cent. for the former. In the chronic cases adhesions were present in 11 out of 14 cases of chronic simple abscesses, or almost 80 per cent., and in two others they were produced artificially before operation, and may have been present before (Quincke). In the chronic putrid abscesses they were present in 18 out of 26, and were produced in one artificially. In 6 they were absent. We thus see that in the majority of cases, both acute and chronic, they are present.

The Technique of Pneumotomy.—Various methods have been proposed to produce adhesions artificially, *e. g.*, Quincke makes an incision, resects a rib, and lays zinc chloride gauze in intercostal space. In some cases he has even applied zinc chloride paste, but this latter method has been quite painful. It requires several weeks for the adhesions to form under these circumstances, and its use has been quite limited. The two methods most employed to produce adhesions when none are present are the suture and tampon, or a combination of both. The suture method was proposed by Roux in 1892, and consists in suturing the parietal and visceral pleura with a round, non-cutting needle. There is but little if any danger of puncturing a superficial abscess, for in such cases there are usually adhesions. The tampon method consists in opening the pleural cavity and walling off the area which it has been proposed to drain by strips of iodoform gauze similar to its use in appendicitis, and then allow-

ing time for adhesions to form, usually about forty-eight hours. In order to avoid opening the pleural cavity until the focus had been found Tuffier advised an extra-pleural palpation of the lung. This has been given up as unreliable and unsatisfactory. A good way is to combine both sutures and tampon, as suggested by Krause, by sewing the strip of iodoform gauze around the edges of the wound. The pneumotomy can thus be done in one stage.

A great danger, of course, in every pneumotomy is pneumothorax, with consequent collapse of the lung. When this occurs during the operation the dyspnea may interfere to such an extent as to render an interruption necessary. If left to itself, pneumothorax usually absorbs within a few weeks. It can be avoided, or rather the lung collapse, by using one of the methods of intra-laryngeal insufflation, either the Fell-O'Dwyer apparatus or the Parham-Matas method. After the pleural cavity has been opened and the lung exposed then it is justifiable to use the exploring needle, but not before. It can be inserted in all directions, until pus has been found, and left in place to be used as a guide. Even the use of this instrument at this stage is not without its dangers. Israel reports one case of fatal hemorrhage resulting from the puncture of a large vessel with his instrument. In regard to the incision in the chest wall, the best is the flap incision, with the convexity downward, and as extensive a thoracotomy as possible. If we have reason to suspect bronchiectasis, and especially in the case of older chronic abscesses, and when the local diagnosis is not positive, it is better to resect two to four ribs at once. If we have reason to suspect a contracted lung it is better to remove the periosteum of the ribs also, so as to enable the cavity to close more readily. If the pleura is greatly thickened in the chronic cases much time can be gained in the healing by removing it. At the present time the knife is preferred to the cautery for opening the lung itself, and then blunt dissection with the finger to explore the interior. Pus

may not appear immediately, but may pour out through the drains in the course of a few days. The cavity can either be tamponed with gauze or a rubber tube used, surrounded with gauze, to prevent the pressure on blood vessels. There is danger of hemorrhage from pressure, however, in the use of both. If there is secondary empyema present, the operation is greatly simplified. Irrigation should not be employed, as there is great danger of carrying the pus to other portions of the lung. If large bronchi communicate with the cavity and a fistulous tract remains, it is best to open the wound, cauterize the bronchi, and remove that portion of the lung itself (pneumectomy) which forms the wall of the abscess cavity. This has been successfully done in several cases. If the cavity shows no tendency to heal, resection of a number of ribs and compression of that side of the thorax has aided in closing the same. If the fistula remains open, patient can wear a bottle containing an antiseptic solution. In regard to the anesthetic which should be used, chloroform is preferable to any other, and as complete an anesthesia as possible; a partial anesthesia is only justifiable when the case is in a grave condition. The patient should never be placed on the sound side, on account of the danger of pus running over from the infected side.

The following case illustrates a number of instructive features in the surgery of pulmonary lesions following pneumonia. The history is the following: G. U., 57 years old, male, had an attack of pneumonia two years ago. Since that time he has coughed up from two to three pints daily of muco-purulent sputum, with fetid odor, so it was impossible to remain in the same room. He has lost weight and strength, so that he was greatly emaciated when I first saw him. I saw him in consultation with Dr. B. F. Flanagan, of Chicago; respirations were 60; the lower border of the right lung, the one which had been affected in the attack of pneumonia, was at the fifth intercostal space in the mammary line, at the sixth rib in the axillary line, and apparently perfectly movable. Anteriorly, on the right side, there was no change in percussion; behind, from the scapula downward, there was an area of dullness about the size of the palm of the hand, and some bulging of the intercostal spaces. One

could also hear a few moist rales over this area of dullness. It was decided that this was a focus of what was suspected to be a chronic putrid abscess; two ribs were resected, the eighth and ninth, just below the scapula, in the posterior axillary line; the pleural cavity was opened and the lung was found adherent, with easily broken down adhesions, so that almost as soon as the pleural cavity was opened the lung collapsed (upper lobe). By palpation one could feel that the lower lobe was adherent to the anterior wall of the chest, and the incision was increased anteriorly until a portion of the ninth and tenth ribs were resected in the anterior axillary line. On opening the pleural cavity a localized small empyema was found, which opened directly into a cavity in the lower lobe, from which some fetid broken-down material escaped. At the edge of the empyema a small pus cavity in lung was opened, apparently separate from the gangrenous cavity. Patient returned from the operation in fairly good condition; pulse and respiration both remained high; he died nine hours after the operation.

The autopsy showed that there had been quite a severe hemorrhage into a gangrenous cavity in the lower lobe, which had been opened; that there was also a slight amount of free blood in the pleural cavity, which had escaped through a tear in the adhesion at the lower edge of the wound. There were firm adhesions binding the right lower lobe to the chest wall, but the remainder of this lung was non-adherent; the latter was collapsed. On section it was seen that I had opened into an area of gangrene in the lower lobe, and had opened one of a series of bronchiectatic abscesses in the lung parenchyma.

This case is instructive in two ways. It shows, first, that physical examinations are apt, even though carefully made, to be misleading; secondly, that, as Korte has experienced in several of his cases, lesions may be coexistent; there may be a gangrenous cavity in one lobe and a system of bronchiectatic cavities in another adjacent one, only one of which may be opened by operation. It also illustrates what I have attempted to bring out before, that the most favorable cases for operation are the acute ones, when the patients are in good condition for pneumotomy.

Conclusions.—1. Both acute and pulmonary abscess and gangrene following pneumonia may develop immediately, and chronic and simple putrid abscesses, with or without

bronchiectases, are more remote sequellæ of both croupous and influenzal pneumonia, especially the latter.

2. The most valuable points in the history are the etiology; the sudden expectoration, after an apparent crisis, of pure non-odorous pus in the simple abscess cases, or of fetid pus in the gangrenous variety. In the chronic cases there is usually a history of a pneumonia having preceded the condition at some considerable time previously, followed by expectoration of large quantities of pus, with exacerbations of fever accompanied by emaciation and frequently clubbed fingers, etc.

3. Signs of cavity are seldom present. The moist rales, especially of large metallic character, are the most reliable physical signs. The character of the sputum is also of great value, whether purulent or fetid. Elastic fibers are more frequently found in gangrene than in abscess, being comparatively rare in the latter.

4. The X-ray is only of confirmatory value, as it shows chiefly thickened areas of lung, and should not be absolutely relied upon. When it shows a shadow at the same point where the physical signs are present it is of value.

5. The prognosis of abscess and gangrene following pneumonia, medically treated, is not very favorable. Many cases of both varieties can be successfully treated in a surgical manner by pneumotomy. One of the greatest difficulties is the exact localization of the focus. The statistics which I have gathered show a marked increase in the percentage of recoveries, especially in the cases which have been reported within the last five years over that of the preceding five or even ten years. The prognosis for the chronic cases is not so favorable. The patients are usually operated upon when in an emaciated condition, and the walls of the cavity are often rigid, so that they do not contract well after being drained, and the free communication of a bronchus with such cavities is also a great barrier. But statistics in this variety are also improving, especially when combined with excision of the affected portion of the lung.

BIBLIOGRAPHY.

Greene, F. G., ... Lancet, 1891, p. 93.
Huber, F., ... Transac. Am. Ped. Assn., Vol. III, 1892.
Krause, F., ... Berl. Klin. Woch., 1895, p. 347.
Lassen, J., ... Diss., 1886.
Coupland, ... Brit. Med. Jour., Vol. II, 1885.
Lutzenburger, ... Inaug. Diss. Halle, 1894.
Matignon, ... Arch. Gen. de Med., 1894, p. 162.
Oehler, ... Munch. Med. Woch., 1891, p. 723.
Openchowski, ... Zeit. f. Klin. Med., Bd. 16, 1889, p. 393.
Osann, ... Diss. Kiel, 1892.
Leech, ... Lancet, January 13, 1894.
Jayle and Jaffray, ... Soc. Anat., 1893.
Quincke, ... Berl. Klin. Woch., No. 18, 1888, and No. 19, 1887.
Riedinger, ... Deutsch. Chirurgie, No. 42, 1888.
Runeberg, ... Deut. Arch. f. Klin. Med., 1887, p. 91, Vol. 41.
Seitz, ... Entwickelung der Lungenchirurgie—Inaug. Diss. Würzburg, 1888.
Spillman and Haushalter, . Rev. de Med., 1888, p. 643.
Trezbitzki, ... Wien Med. Woch., 1893, No. 2.
Walsham, ... St. Barth. Rep., 1890.
Blazejewski, ... Nowing-tekarckie, No. 1, 1890.
Hofmokl, ... Wien Med. Presse, 1892, Nos. 48 and 49.
Osler, ... Johns Hopkins Bulletin, December, 1890.
Bull, ... Berl. Klin. Woch., 1884, No. 42.
Rochester, ... Med. News, 1894, January 20, p. 91.
Kohn, ... Deut. Med. Woch., 1899, No. 13; also Karewski and Korte.
Zenker, ... Archiv. f. Klin. Med. Bd., 50, p. 351.
Sello, ... Zeitschr. f. Klin. Med. 1898, Bd., 36, Heft 1 and 2.
Sonnenburg, ... Handb. v. Penzoldt and Stintzing.
Lenz, ... Centr. f. Chir., 1896, p. 608.
Reclus, ... Centr. f. Chir., 1896, p. 283.
Freyhan, ... Berliner Klinik, Heft 117, p. 898.
Beck, Carl, ... New York Med. Jour., 1897.
Terrier and Raymond, . . . Chir. Dupoumon et de lapleure.
Koenig, ... Handb. der Inn. Med. (Ebstein and Schwalbe).
Karewski, ... Archiv. Klin. Chir. Bd. 57.
Koehler, ... Berl. Klin. Woch., 1898.
Lichtenauer, ... Deut. z. Chir., 1899, Heft 3 and 4.
Sonnenburg, ... Centr. f. Chir., 1897, p. 1137.
Tuffier, ... Proc. Int. Congress, 1897, and Monograph.
Kijewski, J., ... Centr. f. Chir., 1897, p. 950; also Centr. f. Mitth. No. 4, 1901.
Bushnell, ... Amer. Jour. Med. Sciences, 1896, October.
Richerolle, ... Centr. f. Chir., 1887, p. 170.
Wiemrr, ... Centr. f. Chir., 1898, p. 1183.
Gerulanos, ... Deut. Zeit. f. Chir., Bd. 49, p. 312.
Villiere, ... Centr. f. Chir., 1899, p. 25.
Clarke, J., ... Brit. Med. Jour., 1897, September 25th.
Malbot, ... Centr. f. Chir., 1899, p. 685.
Kopfstein, ... Wien Klin. Rundschau.

Herzfeld, ... Centr. f. Chir., 1899, p. 493.
Gross, ... Beitrage. z. Klinischen Chirurgie, Bd. 24.
Guinox, ... Soc. Med. de Hôpitaux, January 27, 1899; also June 8, 1898, and February 3, 1899.
Sapiejko, ... Centr. f. Chir., 1899, p. 1223.
Terrier, ... Ann. de la Soc. Belge de Chir., 1900, No. 6.
Berndt, ... Wien Klin. Rundschau, 1900, 19 and 21.
Riedel, ... Munch. Med. Woch., 1898, No. 28.
Morillon, ... Pneumotomie—These. de Paris, 1897, in Acute Abscess.
Brunz-Mikulicz, ... Handb. der Prkt. Chir., Vol. II (Riedinger and Kummell).
Beck, C., ... Jour. Amer. Med. Assn., 1897: also N. Y. Med. Jour., June 15, 1895.
Wolkowitch, ... Centr. f. Chir., 1898, No. 10.
Schwerin, ... Centr. f. Chir., 1897, No. 40.
Sonnenburg, ... Wien Med. Blatter, No. 40, 1897.
Cornil, ... Bull. de la Soc. Anat., 1892, Vol. VI, No. 1.
Edwards, ... Lancet, 1897, December 18th.
Ingals, ... Jour. Amer. Med. Assn., 1896, August 22d.
Heckstrom, ... Jahr. f. Kinderh., 1889.
Jablokow, ... Archiv. f. Kinderh., Vol. XXXI.
Inches, ... Boston Med. and Surg. Jour., 1881, p. 14.
Zenker, ... Deut. Archiv. f. Med., 1892.
Karonyi, ... Eulenberg Encyc., 1897, Vol. XIII.
Moffit, ... Brit. Med. Jour., 1896, August 7th.
Moir, ... Lancet, January, 1897.
Potier, ... Bull. de la Soc. Anat., 1892, Vol. 32, p. 96.
Russell, ... Amer. Jour. Med. Sciences, October, 1896.
Weiss, ... Wien Med. Woch., Vol. XXIII, No. 13.
Tuffier, T., ... Rev. de Chir., August, 1901, p. 123.
Quincke, ... Mitt. a. d. Grenzgebieten de Med. f. Chir., Vol. I, No. 1.
Tuffier, ... Soc. de Chir., November 27, 1895.
Murphy, ... Jour. Amer. Med. Assn., 1898.
Berndt, ... Wien Klin. Rundschau, Vol. XIV, No. 19–21.
Karewski, ... Ther. de Gegenwart, N. F. II, No. 7, p. 305.
Elsner, Henry L., ... Med. News, Vol. XII, p. 353, March, 1899.
Godlee, ... Brit. Med. Jour., January 21, 1899.
Crerar, ... Brit. Med. Jour., May 20, 1899.
Lejars, ... Soc. de Chir., February 17, 1897, and Gaz. Hebd., 1897, p. 181.
Northrup and McCosh, . . N. Y. Med. Jour., January 14, 1897.
Okell, ... Lancet, 1888, Vol. I, p. 622.
Koch, ... Zeitsch. f. Klin. Med., 1889, T. XVI, p. 393.
Ramsay, ... Ann. of Surg., 1890, T. XI, p. 34.
Phillips and Nash, ... Lancet, 1896, Vol. II, p. 1454.
Tuffier, ... Soc. de Chir., 1895, Obst., p. 765.
White, ... Med. News, 1893, Vol. LXII, p. 38.
Fairchild, ... Chic. Clin. Rev., Vol. IX, No. 93, or Wien Klin. Woch., 1893, p. 633.
Valton, ... Belgique Medicale, 1895, Vol. II, p. 545.
Riedel, ... Munch. Med. Woch., 1898, No. 28.

XXII. THE NECESSITY FOR EXACT DIAGNOSIS IN CERTAIN OPERATIVE PROSTATIC DISEASES.

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There is scarcely any other disease the treatment of which causes so many contradictory reports as in the case of retention of urine secondary to changes in the prostatic gland. We must admit that this is in some degree due to the unreliability of a few observers who do not possess the trustworthiness which we must regard as necessary for the definite determination of these questions. Yet it is a fact that most conscientious and reliable surgeons report with one and the same method of operation the most contradictory results. The reason for this is plain, although as a rule overlooked. We must remember that the prostatic urinary retention with one and the same result can be produced by manifold differing conditions of the prostate gland. Therefore, we are obliged to ascertain which of these changes is present and from this to conclude which method of treatment is most adaptable in each particular case, and naturally, at the same time, to exclude all methods which could give an unfavorable result on account of the existing conditions.

In order to obtain a clear view of the subject it is best, if we classify all cases, to divide them into three groups.

First.—Urinary retention due to prostatic changes may occur when we have alterations in the prostatic urethra proper.

Second.—When the cause is just on the border between urethra and bladder.

Third.—When the pathologic changes in the gland impair or completely abolish the functions of the bladder.

1. It is a well-established fact that the prostatic part of the urethra sometimes becomes greatly obstructed, so that

urination becomes impossible. It might be due to nodular growth of the urethral part of the prostatic compressing the urethral walls, or causing a tortuous passage in the same. It is readily understood in these cases that every operative interference which involves that part of the prostate within or adjoining the bladder would not result favorably. The next question is, then, how are these pathologic conditions to be recognized? The examination per rectum shows these nodules just within the anus, covering or only partly covering the rectal surface of the gland. These nodules may be positively diagnosed with metal instruments per urethram. With this method we either find that we are unable to pass metal instruments, or that as we proceed toward the bladder they do so by jerks, or, as one with a trained sense of touch describes this passage to the entrance of the bladder, as if the tip of the instrument seemingly passes around corners. In order to obtain a good result it is an absolute necessity to remove these mechanical obstructions. From the character of these obstructions, the method of choice must naturally be the removal of these nodules by shelling them out by the perineal route.

2. The type of obstruction between bladder and urethra, *i. e.*, that borders on the internal urethral orifice, may be either a symmetrical thickening or enlargement of the prostate as far as the parts encircle the internal urethral opening or a partial enlargement of single lobes. All these changes have in common that the obstacle to urination is a more or less complete barrier separating practically the trigonum from the urethra. An operative success is to be sought for in a method by which this barrier is completely removed, or is severed to such an extent that again free communication between the bas-fond of the bladder and urethra is made. We call uniform thickening and enlargement of the prostatic margin a "collar-shaped" hypertrophy. A correct diagnosis without incising the bladder can only be made with the cystoscope. It is very important, however,

to be absolutely familiar with the cystoscopic view in these cases. While in normal conditions the margin of the internal urethral orifice appears crescent-shaped, dark red but translucent, the collar-shaped prostate presents itself in a cystoscopic view as follows: The crescent-shaped curve is either flattened to some extent or disappears entirely, so much so that the contour appears absolutely straight. The whole margin appears thick and gives the impression of rigidity; the color is very dark and opaque. The urethral orifice appears close to its margin. A little trick used in this examination makes this uniform enlargement of the prostatic margin more evident, *i. e.*, if we lower the funnel of the cystoscope as far as possible, and withdraw the beak to the utmost, a very dense shadow is thrown in the trigonum. If we confine ourselves in such cases to the typical Bottini incision the result will always be incomplete. It is necessary to make a large number of incisions into this barrier, or to make a complete excision of this collar after opening the bladder.

Cases of enlargement of the individual lobes allow of the best results with the Bottini method, provided two conditions are fulfilled:

(1) That we are fully informed about the exact localization of this enlargement. (2) That we achieve the most exact possible information about the extent of the lobes in their frontal diameters. To a limited extent this information is gained by rectal examination, but never completely. This examination reveals in a general way that the prostate or a certain part of it is enlarged, but it is impossible to state by this examination which lobe is enlarged, and how far the same protrudes into the bladder, and which of these protrusions causes, in fact, the obstacle. Again, the most reliable method to gain the exact information about these conditions is a cystoscopic examination. This examination is supported and completed through an added exploration by means of an elastic olive-tipped bougie. The enlarged

prostatic lobe presents itself through the cystoscope in this way: In place of the crescent-shaped curve there appears a convex curve at the internal urethral orifice. If there is only one lobe enlarged, a concave curve of the balance of the urethral margin persists. In case several lobes are enlarged, each of these enlargements corresponds with a convex outline, while between these protrusions deep depressions are to be seen. Especially do enlargements of the median lobe give a very characteristic picture, because we see behind this lobe a consecutive deepening of the trigonum. At the same time, I would like to state that the cystoscope places us quite often in a position to exclude an operative step at this particular time because of uniform inflammatory and edematous swelling of the prostate. In such cases the urethral margin is uniformly swollen and the blood vessels obliterated. If there is an inflammatory edema present we find the mucous membrane pale and the trigonum arranged in thick, clumsy folds. Sometimes we see on top of these edematous folds a few globules which are perfectly translucent, and are nothing but circumscribed edema in the middle of a generalized edema. It is important to mention that once in a while we observe a transverse folding of the trigonum which is not of an inflammatory origin. It is very important to be informed about the existence of these folds in cystoscopy, because if we are aware of their presence we will avoid catching the beak of the Bottini instrument in them—an unfortunate accident which has repeatedly led to fatal paracystitis.

The olive-tipped bougie gives some information as to whether the internal urethral orifice is impaired. Furthermore, this instrument enables us to gauge quite precisely the extent of the obstacle which is furnished by enlarged prostatic lobes. It is a well-known fact that it is imperative for the success of a Bottini operation that the incisions be long enough so that the barrier is completely severed. The usual rule is that we ought to continue the forward propulsion of the glowing blade as long as the resistance of the hypertrophic

prostate tissue is felt. In reality this sensation is scarcely reliable, as the operator entirely depends on the *estimate*, which is founded more or less on experience. But if we use an olive-tipped bougie following the cystoscopic examination we gain more exact information about the frontal extent of the lobe. The shaft of the bougie is graduated in the same way as the shaft of the Bottini instrument. We measure now the distance from the point where it passes into the bladder cavity and becomes freely movable again. In withdrawing the olive we measure the distance from the point where the olive is caught until it is freed again from this clasp. The intermediate figure gained by these two distances, which are read from the graduation of the shaft, gives a fairly exact result and corresponds to the length of the entire posterior urethra.

We still have another procedure. This gives us the exact length of the parts of the lobes which extend into the bladder. It really corresponds to that part of the prostatic urethra which is within the bladder. If we introduce a sound with a short beak while patient is in a horizontal position and catch the anterior wall, or the part immediately back of the symphysis, it must correspond to the true location of the internal urethral orifice, unless we have to deal with tumor or "collar-shaped" hypertrophy. When the beak is in this position we find in cases of lateral lobe enlargement that we can scarcely turn either to the right or left. To do so we must first push the beak into the cavity of the bladder, then turn the beak 90 degrees to the right, and if we wish to measure this side we withdraw until the beak becomes fixed. Having noted the difference on the shaft of the instrument we read off the length which corresponds to the length of the lobe which protrudes into the bladder. This may be done at every angle. The most important are those of 135 degrees and the posterior measurement. In this latter case we must remember that it often corresponds only to the connecting bar of the lobes and for this reason does not represent pros-

tatic tissue and furthermore the posterior incision can not be made as long as the measurement would indicate. It only does so when other means of diagnosis have shown us that this length is prostatic tissue. Just here the depth of incision is of the greatest importance. An error may lead to a fatal result. The depth of the incision when making the lateral incision depends on the size of the lobes.

Another method to discover during the operation, without withdrawing the Bottini instrument, whether the incisions are of sufficient length or not is the use of Freudenberg-Bierhoff's modification of the incisor. It allows us to place the incisor exactly at the desired point. Although it is impossible to control the incision during the progress of the blade we can do this at once after the incision has been made. In order to do this we turn the beak of the incisor to one side and turn on the current for the lamp and in this way examine the incision. If the incision severs the desired lobe entirely we see the incision running from the trigonum up into the urethra, but should the lobe not be completely cut through we see that the incision ends bluntly inside the respective lobe. In this case the incision must be completed until this distal end shows the same wedge-shaped pole as the central end which points toward the trigonum.

Another important task is accomplished by the cystoscope in enabling us to make the diagnosis of pedunculated lobes. These pedunculated lobes, even if they are not of any considerable size, act in relation to the internal urethral orifice like a ball-and-socket valve. This conception is supported not only by observation on cadavers, but also by clinical observations of possessors of such lobes. The micturition starts properly, but all of a sudden the stream is interrupted until the patient by certain movements which he learns by experience again succeeds in obtaining a free stream. Sometimes it is possible in patients whose vesical muscular coat is not yet exhausted to state the remarkable fact that after the stream is interrupted they are

able to urinate again if they lie down, in most cases placing themselves on one side.

It is obvious that every attempt to cure such a case by a Bottini operation will end in failure. In this statement I am borne out by a recent German publication. The only possible cure is extirpation of these lobes, with their pedicles. If these lobes are very small the operation with a cystoscope will not offer any difficulties. Larger lobes equipped with a substantial thick pedicle are to be removed through a suprapubic operation. It is very important to gather as many points as possible in regard to the functional capacity of the bladder if we want to give reliable prognosis in the Bottini operation. Cystoscopic examination will give us information whether we have to deal with grave cystitis or whether the muscular coat of the bladder is impaired by the formation of cells and pockets. Catheter experiments will prove how much of the contractile power of the bladder is still present. We find patients where after introduction of a catheter a spontaneous flow of the bladder contents does not follow if the patients are in a recumbent position. It is necessary to exert manual pressure upon the abdomen if the bladder is to be emptied. Bladders of this type have lost their power of contraction. In these cases the prognosis will be unfavorable in certain directions, although it must be admitted that sometimes the bladder regains its contractile power after a free passage has been constructed.

Third. Another cause for the obstruction to the flow of urine by changes in the prostate is the formation of large prostatic tumors which grow into the cavity of the bladder. The clinical symptoms of disturbances of micturition do not differ from those produced by common prostatic hypertrophy. But so far as surgical interference is concerned it is extremely important to diagnose the existence of such tumors. In rare cases one might succeed in getting these tumors between the fingers by bimanual palpation and so make a diagnosis. This, however, will only be possible in

very thin individuals with relaxed abdominal walls. An examination under general anesthesia may be resorted to only as an extreme necessity, as such patients usually do not stand the same well. It is impossible to make this diagnosis by any other means or to arrive at definite conclusions. The cystoscope furnishes in such cases no direct evidence, but it serves by exclusion. If we introduce a cystoscope into such a bladder we do not see anything but a dark red flat shadow, although the beak is freely movable even in cases where the tumor is still of a moderate size. The tumor on the anterior wall of the bladder is always in close contact with the cystoscopic window. If we encounter such a condition we follow with another proceeding. We fill up the bladder with water to the limit and mark the percussion outline on the abdominal wall with a colored pencil. While the quantity of the fluid is in a striking disproportion to the size of the bladder which is marked out by percussion, we see that after the fluid is withdrawn that percussion shows that the bladder outline is still above the symphysis. This examination and its results become more distinct by introducing a rubber balloon into the rectum in order to push the bladder toward the abdominal wall. Furthermore, we can notice that emptying the bladder by means of a catheter will never result in yielding such a quantity of fluid as we would expect judging from the extent of the bladder. This distention of the bladder manifests itself by the observation that elastic catheters of considerable length can be used to their entire length without withdrawing any more urine. These patients suffer from all the usual symptoms of bladder tumors; the warmth of the bed gives them a permanent sensation of fullness, pressure, and weariness in the vesical region. The contact of the bladder wall and the tumor evokes pains; after each urination a clonic spasm of the bladder appears. It is evident that a radical cure in such a case can be only accomplished by complete removal of such a prostatic tumor by a suprapubic operation. If the general condition of the

patient should not permit of such interference nothing remains except to establish a permanent fistula. If we consider the mechanical condition of such a case, it goes without saying that such a fistula can only be an abdominal one.

I am firmly convinced that if the suggestions which I have given in this paper are carefully considered and carried out in each case before operative interference, there will be less diversity of opinion concerning the different radical operations for disturbances of urination due to prostatism and better and more definite results will be attained.

XXIII. THE LIMITATIONS AND USES OF THE GALVANO-CAUTERY IN PROSTATIC SURGERY.

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It is not the purpose of the writer to discuss the pathology of prostatic hypertrophy in the consideration of the subject of the use of the cautery. It is, however, pertinent to refer to the mechanical problems involved in any operative procedure directed toward the reduction of prostatic hypertrophy. It is generally agreed that the main object of all operative procedures is the production of a low-level emptying point for the bladder, and consequently the restoration, so far as possible, of the normal relation between the vesical orifice and the bladder, with the establishment of sufficient caliber for the canal both at the vesical orifice and in the prostatic urethra. It is, therefore, of interest in this connection to consider the various mechanical problems involved in the character of the enlargement.

The prostate is enclosed in a firm fibrous capsule, which affords sufficient resistance to give tolerably uniform shape to the enlargement as felt by the rectum. The absence of

similar resistance on the urethral and bladder side of the prostate explains fairly well the irregular and eccentric forms which the growth may assume when examined from within the bladder and from within the prostatic urethra. Rectal examination may disclose a growth of great size projecting into the rectum, which, however, may not be associated with any obstruction on the urethral or bladder side involving interference with bladder function. On the other hand, rectal examination may disclose no enlargement of the prostate, yet there may be sufficient encroachment from the intra-vesical and intra-urethral growths to make urination very difficult or impossible. While on the one hand the large growth felt by the rectum is likely to be symmetrical and fairly smooth to the feel, the growth when examined from within the bladder and urethra is irregular in shape and is not constant or uniform in its shape, size, or location. From a surgical standpoint, therefore, we have to deal with the intra-urethral and intra-vesical growths, and we find the so-called *collar-shaped* growth about the vesical orifice or the elongated *pear-shaped* growth, lifting its apex into the bladder and thereby elevating the vesical orifice far above its original location, or we may have the *anterior horseshoe hypertrophy*, the *posterior horseshoe hypertrophy*, or the *middle lobe growths* on the posterior margin of the urethra, at its entrance into the bladder; the pedunculated and nodular intra-urethral growths which may or may not project into the bladder, and a variety of irregular shaped masses projecting from about the vesical orifice and within the prostatic urethra. Such growths almost universally encroach upon the urethra and bladder space sufficiently to cripple the bladder and urethral function. The shape and position of these growths, to some extent, influence the variation in the development of symptoms in different cases. The same growth may vary in size and shape at different times, owing to the influence of various causes. Constipation of the bowels, exposure to cold, fatigue, and the use of diuretics and of alcoholic stimulants may

induce an increase of the size of a small soft growth and consequently cause it to become a mechanical obstruction of serious importance, whereas it may previously have occasioned little trouble. While the symptoms are usually of gradual development, the occasional sudden occurrence as above indicated is cited to emphasize the influence of the mechanical element in the obstruction.

In considering surgical procedures for the removal of prostatic obstruction, the increased length of the prostatic urethra should always be kept in mind. The fact that the length of the urethra may vary somewhat at different times in the same case is also suggestive as indicating the character of the growth with which we have to deal. The cystoscope introduced through the natural channel unfortunately affords us very limited information. Its value is greater when used through a perineal opening. Measurement of the urethra and conjoined manipulation of the prostate with the finger in the rectum and the hand upon the abdomen, or with the finger in the rectum and a sound in the bladder, aids in some cases in forming an idea of the obstruction, but no method affords the accurate information secured by digital exploration of the bladder. This fact is of great importance in the consideration of any operative procedure contemplating the removal of prostatic obstruction.

The Bottini operation has been given considerable attention of late, but there are certain objections to it. It is an operation done in the dark, with no adequate conception of the size, shape, and position of the hypertrophy with which it is supposed to deal. It simply burns a groove posteriorly and laterally into the vesical orifice. It does not remove the massive nodular hypertrophies in the lateral lobes, and in the nature of things there is an element of uncertainty which always exists in doing any operation incapable of having its technique varied to suit the peculiarities of individual cases. It so happens, however, that in the majority of cases the offending growth is located behind or on the

sides of the urethral opening into the bladder, and when the growth is burned deeply in this locality the emptying point of the bladder is lowered somewhat. Willy Meyer and others have reported remarkable results from this method, but their cases are entirely too recent to base reliable conclusions upon. More or less improvement usually follows any of the milder procedures, and it would seem that the Bottini operation has its chief usefulness in that class of cases where there are no intra-urethral hypertrophies and where the growth is of moderate size, favorably located, and easily accessible. Several years ago Newman devised a cautery consisting of a small wire coiled in a window near the farther end of the instrument and on its posterior side. The writer has used it with seeming benefit in a few cases, but it is superficial and suitable only to soft growths of small size located near the back wall of the urethral orifice.

The writer, several years ago, in a paper before the American Association of Genito-Urinary Surgeons, advocated another method for the use of the galvano-cautery in certain cases of nodular intra-urethral prostatic hypertrophies. The method then used was as follows: In cases where perineal section for drainage revealed the presence of intra-urethral growth, the external wound was made somewhat larger than usual and a very large drainage-tube inserted. After drainage for a few days, the tube was removed and the finger inserted into the wound and the projecting growth located. A single straight tenaculum was then passed along the finger and hooked into the projecting hypertrophies. A large-sized endoscope or a very small-sized cylindrical rectal speculum was then passed over the handle of the straight tenaculum and pushed on through the wound, so that the farther end covered the point held by the hook. A little traction was then made on the tenaculum to draw the hypertrophied tissue into the field of observation, and the entire surface thus exposed was then cocainized by direct application of an 8 per cent. solution. Direct inspection was obtained by the use of a head mirror, and punctures

were made with the galvano-cautery. The resultant slough occasioned no special trouble, and the pain incident to the procedure was either trivial or entirely absent.

Recently, under local anesthesia, this method has been extended to small growths about the vesical orifice. The method used is to make a free perineal section, and after waiting for a few days' drainage, to then locate the growth by means of the finger and with a Koch's cystoscope, with a cold light to aid inspection; punctures are then made in any observed hypertrophies with a long electrode having a slightly curved end. It is the writer's judgment that the use of a cautery in this manner is somewhat limited in its usefulness and gives a comparatively limited area observable in operating, and yet it has seemed to accomplish good results in a few cases. The writer has, quite recently, used a large size (No. 34 French) Koch's endoscopic tube with a cold light and has found it to afford a more satisfactory field for the inspection of growths and the application of the cautery. It is his intention to have a still larger tube made (No. 40 French), through which it is hoped to accomplish still better results. It is probable that Koch's cystoscope, if made of large size (about No. 40 French), would be more easily manipulated in some cases where the prostatic urethra is tortuous and where the vesical orifice is displaced very far upward and forward. The effectiveness of the cauterization is markedly increased by having an electrode made sufficiently long and with the cautery measuring a little less than one half inch in length and placed at an oblique angle.

The direct application of the cautery through a suprapubic opening would seem to be advisable in some cases, but its use through such an opening or in the manner above described through a perineal opening should be limited to selected cases, and the writer does not believe that the use of the cautery is warranted in any case without its use has been preceded by definite determination of the size, shape, position, and character of the growth by digital examination or by direct inspection.

XXIV. CIRCUMCISION AND VENEREAL DISEASES.

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In this day of close attention to detail observation of the etiologic factors of disease processes, it seems scarcely necessary to enumerate the many conditions under which removal of the prepuce is a desirable or even necessary surgical procedure; and yet, in a not inconsiderable experience in genito-urinary work, the thought has often been forced upon me that circumcision has been and is being performed altogether infrequently, at least upon those individuals who, innocent or guilty, become subject to the possibility of venereal infections, such cases being the ones that have most often come under my observation.

No thoughtful man has failed to note the many serious conditions in which the existence of a long, constricted, adherent, or inflamed prepuce is an important causative factor; and almost every surgeon has had the opportunity of observing the relief afforded a child or adolescent in such conditions when that causative factor was removed. Mental irritability, enuresis, incontinence of urine, painful micturition, numerous nervous symptoms; worse, afflictions indirectly resulting from straining—hernia and rectal prolapse; still worse, that vicious and life-destroying indulgence, masturbation, which frequently has its origin in the innocent handling of the genitals indulged in by the child to relieve local irritation and discomfort; all these come in that category, and in all of them, not absolutely but commonly, the prepuce, perverted anatomically or physiologically, plays an important part. Not for the above-mentioned conditions alone is it my purpose to advocate universal circumcision, nor yet for hygienic reasons, though it is my humble belief that the necessity for genital cleanliness is sufficient to

make the operation justifiable, but for the purpose of decreasing venereal infection do I think it a wise prophylactic measure. Not so much should it be done to protect those whose moral sense allows them with impunity to subject themselves to such diseases, and thus put a safety-valve upon morality, but to protect those who innocently become involved in the snares and horrors of venereal infection. Of the objections to such universal foreskin amputation I am well aware, nor am I optimistic enough to prognosticate an immediate, marked decrease in the occurrence of gonorrhea and syphilis, but no prophylactic measure was ever productive of instantaneous results. If any one of a number of causes favoring a certain disease be removed, the inevitable result must be a decrease in extent or intensity of that disease.

Before advocating any universal measure there must be taken into account two things: first, the harm which that measure can occasion; second, the good which it can accomplish; in other words, Is it a safe measure and will it benefit individuals or mankind enough to warrant its adoption? The first, in this case, is easily disposed of, because with proper precautions, and in the hands of competent operators, circumcision may be said to be almost wholly without risk to life of the individual or integrity of the parts involved. The continuance during centuries of the operation (if the Hebraic religious rite deserves the name) among the Jews shows that it has wrought no harm either in the physical conformation of the organ nor in the procreative ability of the race. Some writers have quite seriously made mention of the fact that the post-operative exposure and hardening of the glans decreases the sexual appetite through lessening of the sensitiveness of the glans, and that thus procreative desire might be lessened. I scarcely think that such a statement demands serious consideration. The second proposition, namely, What good will the operation accomplish? it is the purpose of this paper to consider, by treating of the

relationship existing between the prepuce and venereal infection, because the author believes it is in this field that the greatest good of circumcision lies, and it is especially in connection with syphilis that the benefits are to be looked for, less in the treatment and cure than in the prevention thereof. If one case can be prevented, one case of that infection which, with relentless energy, pursues all classes alike, then the preventive measure is worthy of consideration; and if one case is prevented, during the years to follow many cases will have been prevented, since each one is the parent of many more.

Without attempting to bring to mind all the etiologic factors of venereal diseases in detail, I wish merely to call attention to the fact that the etiology of any infection necessarily involves the consideration of certain general principles, specifically two: First, the presence of active infecting agents, whatever their natures may be; second, conditions under which those agents are allowed entrance to the tissues, where they may lodge and develop, thereby infecting the part, or whence they may migrate and involve parts more suitable for infection; in other words, we must consider the exciting causes and the predisposing causes. It is generally conceded that in syphilis, gonorrhea, and so-called chancroidal infections we have specific infecting agents with which we are more or less acquainted. If, then, these are present and suitable conditions of food, temperature, and moisture are also present, an infection results. These suitable conditions are what we are pleased to call the predisposing causes, and they are of quite as much if not of more importance in determining an infection than the exciting cause itself.

Let us look first at the anatomical relationship of the parts here concerned and see whether or not they cater invitingly to the wandering bacterial cell. We have the glans covered with a tight-fitting cap, forming a cavity, not real but potential, the walls of which rub freely upon each other, and which are capable and do pour out a secre-

tion. This secretion, smegma and mucus, except in the case of those who are scrupulously clean, remains here and in the absence of light and air soon decomposes and acts as a distinct irritant to the part—every physician has been consulted for that condition of balanoposthitis—this foul and irritating secretion remains under the prepuce, especially in the fossæ on either side of the frenum and in the coronal sulcus, and the glando-preputial cavity becomes an ideal feeding and breeding place for germs of any and every kind. If the diplococci of Neisser are present, safely lodged in a fold with plenty of heat, food, and moisture, they will increase in number and virulence, will encroach more and more upon the tissues near the meatus, finally enter the urethra and induce a specific gonorrheal urethritis. If the causative agents, the exciting causes of syphilis or the chancroidal poison (which I believe to be only a variation of a very ordinary infection) are present, we have the initial lesion of syphilis, or the chancroidal ulcer developed in the place where the germs have concentrated and broken down the tissue barrier.

Let us now, on the other hand, look at the state of affairs after circumcision has been performed. The glans is exposed and all the pockets, the retro-preputial fold and the fossa on either side of the frenum, are obliterated, provided, of course, the operation has been properly performed. The surface of the glans is dry, hardened, and the epithelium is thickened, brawny-looking, quite different, indeed, from the soft, macerated, and filth-containing structure of the uncircumcised. Can any one look at the two cases, compare them, and fail to acknowledge the greater liability of infection in the uncircumcised, both for physical and physiological reasons?

Now, after all this has been said, what is the importance of it? What has it all to do with venereal infection? First comes the objector, who says: "But how about the so-called suction action? Does not the urethra take in the poison of

impure connection at the time of intercourse? Is not the urethra infected primarily?" So it is, I believe, in some cases, though I question the propriety of the word "suction" in this connection; but this pertinent fact is also to be borne in mind, that very many cases of absolutely anterior urethritis develop so long after coitus that one must believe that the urethral tissues have been involved later than at the time of intercourse; in other words, those cases I take to be the ones in which the germs have been retained under a prepuce and later have entered the urethra. In support of this I may say that of 267 cases of gonorrhea treated in private practice during the past four years, I have kept careful records with special reference to the preputial condition. Of the 267, 37 had been circumcised. The time elapsing between exposure and the appearance of gonorrheal symptoms—and that was invariably the discharge—among the 230 in by far the majority of cases was greater than among the 37. Of course some of the uncircumcised also had the disease appear early, they having become infected at the time of connection. Among the circumcised, almost without exception, symptoms appeared on or before the fourth day, which tends to show that urethral infection in their cases took place at coitus; in no case among the latter did the signs of urethritis appear later than the fifth day.

The next objector says: "But if a man cleanse himself efficiently after impure connection he can rid himself of the poison." So he can, but any one who has tried to cleanse the accumulated debris of smegma, mucus, and cells from under the prepuce of a not scrupulously clean individual knows how very difficult it is to accomplish this efficient cleansing, especially in the preputial folds.

The third objector says: "But circumcised people also contract gonorrhea." Certainly, many of them do, and unfortunately one can not compute the ratio of occurrence, simply because one can not compute the ratio of the circumcised to the uncircumcised; but from the few scattered and

unsatisfactory statistics to be found it appears that in dispensaries where many Jewish patients are admitted the percentage appearing in the venereal department is usually much lower than in the other departments. In my own practice, one fourth of which brought me in contact with Jewish people, out of 267 cases of gonorrhea but 19 were Jews. Computing from the general average of Jewish patients with whom I had to deal, there ought to have been 67. It may be that the Jews are less guilty of lax morals than the Gentiles, but I scarcely think this to be the proper explanation.

In syphilis, according to my experience, which I recognize is small, but from which I have learned many valuable lessons, the facts are still more pertinent. Statistics on this question are almost impossible to obtain; one analysis of 330 cases, given by Jonathan Hutchinson (Medical Times and Gazette, December 1, 1855) many years ago, shows that in a hospital in which about one third of the patients were Jews only 11 out of 176 cases of syphilis occurred in Jews. In a recent number of the London Lancet, Mr. E. Harding Freeland, F. R. C. S., states that during three years' experience as surgeon to a steamship company employing Lascars and Sedi boys, he never saw a primary syphilitic lesion among the Lascars, who, being Mohammedans, are circumcised, but saw plenty of them among the uncircumcised Sedi boys. Of 35 primary syphilitic lesions which have come under my observation, but 3 were upon Jewish people. For reasons requiring no explanation chancres and chancroids in the male appear in the greatest number of cases upon the genitals, and according to all observers, most commonly upon the prepuce. In a table compiled by Mr. Freeland from statistics by Fournier, Clerc, and Berkeley Hill, of 898 primary lesions, 659, or 73 3-10 per cent., appeared on the prepuce or coronal furrow, the retro-preputial fold; of the 35 which I have seen, all but 4, 3 on the glans of Jewish patients and 1 on the lip, appeared upon the prepuce. As Mr. Freeland

says, it is scarcely to be hoped for that previous circumcision would have prevented all these cases; but many will willingly admit it reasonable to suppose that a considerable number of them might never have occurred.

The importance of all this is, as I have said before, not to make it safe for man to depart from the straight and narrow path of virtue, but to protect, if possible, those who now suffer from his misdemeanors. If circumcision will help the innocent who are afflicted, along with the guilty; if it will decrease their numbers at all, and I believe that it will, then let it be done in a way to insure the greatest good to all concerned; let every male child born with a prepuce long enough to deserve the name be relieved of that appendage at an early age.

It was my purpose to consider also the question of circumcision in its relationship to existing venereal infections as well as the efficient operative procedure itself, but lack of time compels me to defer. I beg leave here to conclude my paper with that quotation from Ricord with which Mr. Freeland, in the Lancet of December 29, 1900, began his, it so aptly expresses my views in this matter:

"The prepuce is an appendix to the genital organs, the object of which I could never divine; instead of being of use, it leads to a great deal of inconvenience, and the Jews have acted kindly in circumcising their children, as it renders them free from at least one of the ills to which flesh is heir." (Watson, Edinburg Medical Journal, Vol. XVIII, page 752.)

XXV. MODERN METHODS OF TREATING SYPHILIS.

By EUGENE CARSON HAY, M. D.,
Hot Springs, Ark.

In the treatment of syphilis, as in many other diseases, the problem is expulsion of the toxin and the destruction of the toxic agents. In our efforts to achieve these objects it is necessary to take care lest, while removing the untoward symptoms directly traceable to a specific disease, we derange the organs or destroy, together with the microbe, portions of the system in which he has made his home. It is a common saying nowadays that syphilis is better understood, more easily handled, and altogether less serious a complaint than gonorrhea. This is one of the half-truths which is worse than falsehood, for while the routine methods of treating syphilis may be simple enough, the actual cure of the disease requires vigorous methods and a long period of regular and systematic treatment, and no man living knows to what complications it may not give rise and to what extent it may not be transmitted.

I make these general remarks for the purpose of emphasizing the fact that the disease is not one about which we can dogmatize, or shut the book and say no more is to be learned. Great progress has undoubtedly been made in recent times in the treatment of syphilis no less than of other diseases, and the result is that it is no longer so prevalent or so terribly severe in its manifestations as it once was. Still the ugly fact remains that in large cities the average attendance at the genito-urinary clinics of some of the hospitals numbers a hundred or more and that of these about one tenth are found to have acquired the initial sore which is the assured first stage of syphilis. The majority of the victims belong to the lower class of the community, who have not the means to secure for themselves the best kind of treatment, and

whose habits and mental and moral condition are such that they are too apt to be satisfied with the removal of the more disagreeable symptoms, and go about spreading the disease, which, continuously gaining fresh vigor from this source, makes its way upward till the most affluent and refined get caught in its loathsome meshes.

It is, however, of the methods of treating the disease that I undertook to speak. This I proceed to do with diffidence, notwithstanding a long experience at the Mecca of American syphilitics, and the cause of my diffidence is that no two cases that come before us are exactly similar, run the same course, or arrive at the same end, and that it is never safe to tell a patient positively even after a three years' course of treatment more than this, that at the particular time no symptoms of the disease are discoverable, though generally speaking at the expiration of two years if no symptoms have developed a patient may consider himself practically cured. While making these admissions, I know that the methods pursued at Hot Springs are such as centuries of medical experience have shown to be the best adapted for the purpose, and we are greatly aided in our work by climatic advantages such as exist but in few other places. I have read in some of the older books, especially the French writers, that "while mercury is by some esteemed the best remedy, the disease admits of cure without it." I am not prepared to say that the latter part of this dictum can be safely indorsed; but this I do not hesitate to say, that if syphilis can be cured without the use of mercury, there is no agency so far discovered that will be so efficacious for the purpose as systematic bathing properly conducted under proper conditions, and the drinking of large quantities of pure water.

Our great advantage at the Springs to my mind lies in the fact that more heroic treatment and larger quantities of mercury and iodide can be tolerated while taking the baths without producing systemic disturbances, and in fact the patient thrives on doses that would produce prostration and

revulsion to treatment at home. If we depended on the hot water alone no such results could be obtained as we get from the liberal use of mercury and iodide in conjunction with the bath.

For over 400 years mercury has held its position not only as a remedy but as a specific for syphilis. Differences of opinion have always existed as to the best form in which it can be administered, and even yet there is far from being agreement on this point. It is open to objection because it interferes with the stomach and bowels, produces ptyalism, anemia, and loss of weight and strength, and after being used for a length of time loses its power for good and has to be temporarily abandoned in favor of tonics or alteratives. With all these drawbacks, it can not be dispensed with, and therefore it is of the utmost importance to ascertain the most tolerable and at the same time the most effective methods in which it can be used. At Hot Springs inunctions are much in vogue, and in conjunction with baths are productive as a rule of very satisfactory results. But for non-resident patients, and those generally who have not facilities for taking medical baths and being systematically rubbed by trained nurses, the need has long been felt for a good means of internal administration. Protoiodide has for some time been the form of medicine which has met with most favor, especially the G. & L. pill, but even with it the results are very uncertain, and it frequently leads to gastro-enteritis, diarrhea, etc. A similar experience is obtained with tannate of mercury and bichloride. With all these forms of mercury adjuvants and alteratives are requisite, and the physician has always to be on the watch for the signs of gastric irritation, looseness of the bowels, salivation, and other unfavorable symptoms.

For the reasons indicated, genito-urinary specialists have always an open eye for new remedies or methods that come to them from reputable and reliable sources. While in New York one year ago I went a round of the hospitals and made

searching inquiries at each as to the methods pursued and results obtained. At Bellevue, where an unusually large number of cases are attended to daily in the outdoor department, I found that Dr. Winfield Ayres was conducting experiments with the new preparation mercurol, and he gave me such favorable reports of the success with which he was meeting that I resolved to try the drug when I returned home.

Mercurol, as you are probably aware, is a nucleid of mercury. It was originally introduced as a remedy for gonorrhea, in which I had used it for some time, and in that connection Prof. Ramon Guiteras, of the New York Post-Graduate Hospital and Medical School, has pronounced it superior to protargol and argonin[1], and it has the advantage of being non-irritating to the mucous membrane.

Dr. Ayers told me that having heard of the success of the preparation in affections of this kind, it occurred to him that it would be still more useful in syphilis, and that accordingly he had a quantity of the drug made up into tablets for experimental purposes. The results of the observations made by the doctor and his clinical assistants at Bellevue were extremely satisfactory. They were reported in the Philadelphia Medical Journal last fall,[2] and I understand that since then the tablets have been coming into general use in this country and abroad.

My own experience with the drug has extended over the best part of a year, during which time I have treated 100 cases. Of these 100 cases 75 have been completed, or I should say have passed from my immediate observation with instruction to continue their treatment at home. Twenty-five are still under observation, 16 dispensary cases and 9 in private practice. Of the 75, 44 were dispensary patients and 31 in private practice. The latter had by far the greater

[1] "Some Notes on the Use of Mercurol: A New Remedy in Urethritis." By Ramon Guiteras, M. D., Prof. of Genito-Urinary Surgery in the Post-Graduate Medical College of New York: Lecturer on Genito-Urinary Surgery in the University of the City of New York, etc The Lancet (London), September 22, 1900.

[2] "The Treatment of Syphilis. A new and tolerable form of administering mercury, with report of sixty-five cases treated at Bellevue Hospital." By Winfield Ayers, M. D., attending Genito-Urinary Surgeon at Bellevue Hospital, outdoor department. Philadelphia Medical Journal, November 10, 1900.

advantage, as shown by more rapid and better clinical results, because they were all patients from the better walks of life, with excellent hygienic and comfortable surroundings; but even the dispensary cases made very rapid progress under the influence of mercurol and baths. All the cases selected were in a secondary stage, from a few weeks from date of infection to two and one half years. By giving hot baths while taking mercurol I was enabled to push it to a much higher point in dosage than could be given away from the Springs. The method I pursued was to give a one grain tablet four times a day, adding one tablet every day until a slight relaxation of the bowels was produced, when I cut the daily dose down to one third and had the patients continue this as a maximum dose every day. The average dose was from six to eight tablets a day, though one patient reached fifteen tablets a day before his bowels were affected.

Case No. 20 illustrates the advantage of mercurol over the other salts of mercury in not affecting the gums. A young man, 21 years old, of previous good and robust health, presented himself eight weeks after the development of chancre. The secondaries developed four weeks after the initial lesion appeared, and he had been taking protoiodide since the first appearance of the rash. At the time of this first visit a large papular eruption still existed over the chest, abdomen, arms, and back. In addition his throat was very sore and he was suffering with nocturnal headaches and rheumatic pains in shoulders, elbows, and over sternum. His gums were very sore, swollen, and blue along the edges, with the typical patches just back of each wisdom tooth that are so frequently caused by mercury, being due to the redundancy of the gums. I sent him to a dentist to have his teeth cleaned, stopped specific treatment for four days, and gave him a hot vapor bath each day. As his time was so limited, I then commenced inunctions of mercury. After the application of two inunctions, one drachm each, mercurial cramps were produced and the gums commenced to puff up again. I then discontinued inunctions and placed him on one-grain tablets of mercurol t. i. d., with the addition of a small dose of iodide to relieve his throat, headaches, and rheumatic pains. The iodide was continued ten days and then stopped, as the symptoms for which it was given

had subsided, and mercurol was continued for one month, with the result of a rapid disappearance of the rash without any gastric or intestinal distress, and his gums resumed their healthy condition.

Case 15 illustrates the rapid action of mercurol. J. B., aged 24, developed chancre eight weeks before coming under my care. On examination I found he had a large indurated scar at the seat of chancre. His body was covered, especially the thighs, chest, arms, and back, with a very mild roseola and he had a most pronounced general adenopathy; his scrotum was covered and his arms surrounded with condylomata, and his mouth presented the worst case of buccal syphilis I have ever seen. The interior of his lips, both upper and lower, tongue, fauces, and throat were one solid mucous patch, the saliva pouring forth from his mouth in a constant stream. The tongue was swollen so that he could not talk intelligibly. I immediately put him on mercurol, grain one, four times a day, increasing one tablet each day, and 30 grains of iodide t. i. d., increasing five grains each dose until 75 grains at a dose was reached. I had the pleasure of seeing this young man's mouth heal completely in ten days, with rapid disappearance of the cutaneous symptoms. This was the case I increased to 15 grains of mercurol a day, when diarrhea was produced. I then reduced the dose to 10 grains a day. The iodide was stopped at the expiration of two weeks, but mercurol was continued for four weeks longer, when the patient departed for his home with all physical signs of lues obliterated except a slight general adenopathy.

The results I have obtained are extremely satisfactory and in the main agree with those reported by Dr. Ayres, though our warmer climate and the free use of baths which we enjoin on all our patients has enabled me to increase the dose somewhat more than is done in New York. Two things have always to be ascertained in entering on an experiment with new preparations of this kind—first, the maximum dose that can be given without producing untoward symptoms, and secondly, the minimum dose that will control the symptoms. The former varies largely according to the constitution and idiosyncracies of different patients, but as a rule it may be laid down that the nuclein with which the mercury is compounded makes it possible for the average constitution

to receive with impunity considerably larger doses of the metal than it would do otherwise. Thus Dr. Ayres found that quite a number of patients could take six, seven, or eight one-grain pills t. i. d., and in one case he told me about a young man took by mistake twelve and one half grains t. i. d. for two full days, and with no more serious results than the production of a rather violent attack of diarrhea. As each grain of mercurol contains one tenth of metallic mercury, this was equivalent to a total dosage in 48 hours of 7½ grains of pure mercury—more by a great deal than any of us would care to administer of any of the other salts in vogue.

This is interesting as showing the comparative safety of the drug, but it is of less practical importance than the reverse point—the minimum dosage that will suffice to control syphilitic symptoms. Dr. Ayres' experience leads him to fix the average dosage at two grains t. i. d., and here I may mention that his regular custom, as soon as the diagnosis of syphilis is made, is to prescribe one grain t. i. d. and increase the daily dosage by one grain every fourth day until the point of tolerance is reached, as shown by the slight tendency to salivation or diarrhea, or until there are indications that the symptoms are under control. With the superior advantage we have at Hot Springs the dosage is higher, as previously stated.

When the drug begins to act, it is wonderful how soon its effects are manifested. This applies more particularly to skin eruptions, a decided change in which may often be seen in the course of two or three days, while it is not uncommon for them to disappear entirely within two or three weeks. Its action on mucous patches, though slower, is also quite satisfactory, with the assistance of iodide, especially when the patches are in the throat. It has a good, if somewhat tardy, effect on the chancre. A mercurol salve I observe has likewise been used with not a little success on syphilitic sores. [1]Dr. Stone, of the City Hospital, Blackwell's Island,

[1] "Mercurol Inunctions Preparatory to Skin Grafting in Leg Ulcers." By William Ridgely Stone, M. D., New York Medical Age, April, 1901.

N. Y., reports that he has found it very satisfactory for the purpose of cleaning indolent and dirty leg ulcers and getting them in a proper condition for skin grafting. Usually, he says, in syphilitic ulcers only about 25 per cent give satisfactory results after grafting, but out of seven cases in which he used mercurol as a preliminary inunction he found that five turned out well. Personally I have had no experience with the preparation except as an internal medicine, but having come across this report in looking over the literature on the subject I considered it relevant.

While the positive results have been highly satisfactory in the hundred cases of which I have spoken, it is principally on account of what may be called the negative results that mercurol is to be commended. In other words, its chief virtue is that it is a tolerable form of administering mercury. This means that it does not produce gastro-enteritis, and that it produces diarrhea only when pushed to full or beyond toleration. These symptoms can be easily controlled, and the result is that as a consequence of its non-irritating qualities its use can be steadily persevered with until the desired results are obtained.

The importance of this will be appreciated by general practitioners, as well as by specialists, who have had experience with other drugs, under which, as Dr. Ayres observes, "everything seems to be going along all right up to a certain point, then gastro-enteritis sets in, the patient becomes very anemic and generally run down, and a change has to be made to some other medicine." The advantage of mercurol is that generally speaking you do not require to change,because none of those untoward results as a rule are produced which require a temporary cessation of the mercury and a substitution of tonics, etc. I have kept a careful record of all the cases in which I have used the drug. Instead of reporting these in detail, I will give a brief summary of the results obtained and the conclusions at which I have arrived. In the first place, I have had no cases, not even one of old

stubborn secondaries, in which the drug has failed to have a good effect. Secondly, in the majority of my cases the improvement has been as rapid and satisfactory, and generally more so, than in cases where other methods of internal administration of mercury were pursued. Thirdly, there were only three or four cases in which I thought it well to suspend the use of medicine for a time, in order to check diarrhea, tone up the system, etc., and in none of these could I affirm positively that the disorders referred to were directly traceable to the mercury.

Of course it may be objected that one year's experience is not sufficient on which to base an opinion of the permanent effects of any drug used in the treatment of syphilis. This is perfectly true, but in any case the first thing to do is to control the symptoms, and that can apparently be done more satisfactorily with mercurol than with any other preparation of mercury given internally. Besides, there is this to be borne in mind: We are not dealing here with a new drug, but only with a new form of administering it. There is certainly no reason for believing that mercury given in the form of a nucleid will produce results of a less durable character than mercury given in any other form. While we can never say that syphilis has been completely extirpated, I feel there is some ground for satisfaction in being able, as I am, to say that out of the hundred patients who have been treated by me with mercurol and baths only, and have been under treatment for a period of three months or longer, none show any trace of the disease except possibly a slight general adenopathy, while those now under my care are getting along as well as could be desired.

I may add, as we have heard a good deal at this meeting about the importance of blood testing, that in all my private cases I made blood tests from week to week, and I noticed the hemoglobin increase more rapidly than under any other mercurial medication, from which it would appear that the preparation is a wonderful blood builder.

While preparing this paper I observed in the Medical Council, of Philadelphia, an interesting article on "Cell Medication," by Dr. John Aulde.[1] One passage in particular attracted my attention as bearing on this subject, which I quote: "For the treatment of the manifestation of secondary syphilis I have used a combination of nuclein with mercury (nucleid of mercury), and can speak in the highest terms of praise of its value in the class of cases mentioned. As compared with protoiodide, it is more constant and regular in its therapeutic effects, and in the dose employed has never caused the least symptom of ptyalism. Instead of setting up gastric and intestinal irritation, this combination improves the digestive capacity, probably through its stimulating effects upon hepatic metabolism, together with its influence upon cellular activity throughout the system. Necessarily, therefore, there is a prompt subsidence of cutaneous manifestations; mucous patches generally disappear within a few days after beginning treatment, and I have never known patients to complain of the characteristic pains when directions as to eating and drinking were followed. The dose ranges from 1-100th to 1-50th grain every two hours for the first week, after which the frequency of administration can be determined by the susceptibility of the patient to treatment and the manifest effects of medication." Though Dr. Aulde appears to have used homeopathic doses as compared with those experimented on by Dr. Ayres and myself, I thought that this testimony of an independent observer as to the value of a nucleid of mercury in the treatment of syphilis was not without value as a corroboration of the conclusions which I—following in the wake of my friend Dr. Ayres—have come to as to the advantages of this new method of administering mercury.

[1] "Cell Medication," by John Aulde, M. D. A paper read at the annual meeting of the Kansas State Medical Society. The Medical Council, Philadelphia, August, 1901.

XXVI. SOME CAUSES AND REMEDIES FOR IGNORED SYPHILIS.

By M. L. HEIDINGSFELD, M. D.,
Cincinnati, O.

There are few diseases which are accompanied by a train of symptoms more marked, well defined, and characteristic than those of syphilis, so that, as a rule, relatively little diffi-

Fig. 1 (Case 1).—J. W. M., aged thirty-two years. A syphilitic lesion was diagnosed as cancerous and removed by a cancer-quack, with a goodly portion of the lip, in 1889. (Borrowed with kind permission from *Journal American Medical Association*, July 13, 1901.)

culty is encountered in establishing a positive diagnosis. This rule, however, has its exceptions, and not infrequently cases present themselves with symptoms so obscure and ill-defined, and bearing such a close resemblance to non-syphi-

litic affections, that even the skilled and experienced specialist will hesitate and often await development of corroborative evidence before committing himself to a positive opinion.

There is probably no affection where greater importance can be attached to an early and properly made diagnosis, not only because of its marked amenability to proper treatment, but also because of its extensive ravages when left

FIG. 2 (Case 1).—J. W. M. Cicatricial deformity resulting from the removal from the lower border of the scalp of some syphilitic papules, for a supposed cancerous growth, by a cancer-quack. From *Journal American Medical Association*, July 13, 1901.

unchecked. To establish in every case of suspected syphilis a diagnosis based on evidence so conclusive that its positiveness or negativeness can not be questioned is a matter of material importance. I am assured that this degree of expertness can be readily attained if certain general rules in diagnosis are observed; that it has not thus far been generally acquired is evidenced by the innumerable cases of

late syphilitic manifestation without a history of infection and without previous recognition. This is a matter of common observation and has frequently been commented upon by many practitioners. Fournier[1] reports, out of a total of 4,142 cases of syphilis in private practice, 193 cases of tertiary syphilis who denied they had ever been infected.

In my own practice, out of a total of 134 cases of syphilis, there are 21 ignored cases of late syphilis, cases where the patient denied any previous infection, or professed complete ignorance. It is a matter of some significance when nearly 16 per cent of the cases of syphilis in private practice, or one

FIG. 3 (Case 1).—Mass of tissue removed from posterior border of scalp by means of a cancer-quack's paste, measuring 3½ x 2½ x ¾ inches. From *Journal American Medical Association*, July 13, 1901.

case in every six, remains unrecognized, and is an indication that the present methods of examination are more or less faulty. It impresses me that one source of common error is the establishment of a diagnosis based solely on the appearance of the infecting chancre. Although the disease can be correctly conjectured by this method in the vast majority of cases, it is often misleading; it is much better policy to hold the diagnosis *sub judice* until it can be positively confirmed by the appearance of the secondary eruption. Syphilis frequently implants itself upon the basis of a soft chancre infection, and the latter are often so changed by physical and chemical agencies that their true character can not be

[1] Fournièr: Jour. de Med. et Chir., 1901.

recognized. Moreover, according to recent investigations of Watrazewski[1] and others, much is lost and nothing is gained by the too early institution of constitutional treatment. According to Watrazewski, out of a total of 192 cases of malignant syphilis, syphilis precox, syphilis complicating the brain and cord, constitutional treatment was instituted in 135; *i. e.*, 74.4 per cent., before the appearance of the roseola. In the light of investigation, it seems that nature, during the period of the secondary incubation, is endeavoring, unassisted, to eliminate the toxins, and if constitutional treatment is deferred until secondary eruption manifests itself the course of the disease is much milder, more uniform, and more amenable to treatment; what is equally important is that it inures to the best interest of patient and practitioner by once and for all time firmly establishing the diagnosis, entirely dispelling any future doubt, and the disease and treatment will not be ignored. Temporizing would also eliminate the grave and distressing danger of patients becoming imbued with the morbid and depressing idea that they are syphilitics, though entirely free from its taint.

This is directly opposed to the principles of those who advocate the early institution of constitutional treatment, who, on the basis of giving the patient the benefit of the doubt, begin treatment with the appearance of the chancre, and, if secondary eruption and other symptoms fail to manifest themselves, attribute it all to the good effects of the early instituted treatment. I am sure that it falls to the lot of nearly every one to meet with examples of this class, who in after years have acquired a true syphilitic chancre, which has been followed by roseola and secondary manifestations.

A large class of cases of ignored syphilis can be attributed to the negative character of the history. There is probably no disease where history plays a more unreliable rôle

[1] Watrazewski: Arch. f. Derm., xlvi, 2.11.

and at the same time is given more general credence. In a large percentage of cases a diagnosis is firmly established or promptly ruled out by the manner in which a suspected patient answers a few leading questions. In a disease of the character of syphilis, where deception and ignorance on the part of the patient are so frequently evident, history should occupy a very unimportant place, and should be reserved for the last step of the examination, and then be taken *cum grano salis*, merely for confirmatory evidence. Patients frequently experience a false sense of pride and are willing to go to great extremes before making admissions, and often

FIG. 4 (Case 4).—Annular syphilide of two years' duration.

the dread of moral guilt or of domestic complications induces them to place the matter in its most favorable light, or to entirely conceal the facts. History in women and children, by reason of concealed facts or from the nature of their conditions, is particularly unreliable. History, therefore, at best, even when taken from the higher and more educated classes, is eminently unreliable, and if it were entirely disregarded a large class of ignored syphilis would be eliminated.

A large class of ignored syphilis can be placed under the head of unrecognized extra-genital infection. Extra-genital

syphilis is not always easily detected, and is frequently overlooked even when moderate skill and care is exercised. The unsuspecting patient invariably gives the condition little serious consideration, and usually removes himself from professional observation until later manifestations of a graver nature make their appearance. In the light of these facts the elimination of these cases is not an easy proposition, and the best solution that can be offered is to require the examining physician to be ever mindful of this mode of in-

FIG. 5 (Case 3.)—Ulcerating gumma of the nose. Diagnosed lupus and treated as such for more than a year.

fection, to be prompt to recognize its manifestations, and be prepared to trace suspected cases to such a cause.

Finally, there is a class of ignored syphilis established by faulty diagnosis; the vast majority of these are incurred at the time of the primary infection, when the examining physician has dismissed the genital lesion with slight attention, with the assurance to the patient that nothing will manifest itself. If the examining physician would render a guarded prognosis relative to every form of genital or ve-

nereal lesion, holding the patient under careful observation for a period of sixty to ninety days, this class of cases would be largely eliminated.

As a result of these and other causes, it is not at all surprising that a large per cent. of the cases of syphilis are ignored. In my own private practice during the past two years, 21 cases out of a total of 134, or nearly 16 per cent., one case in every six, denied having syphilis, or of even having contracted the disease, though showing unmistakable

FIG. 6 (Case 8).—Ulcerating papular syphilide of seven years' duration, which was improperly diagnosed lupus.

evidence in the form of late secondary or tertiary manifestations.

One of the most interesting cases occurred in J. W. M.,[1] aged 32 years, who contracted a slight venereal lesion eight years ago, which his attending physician dismissed without serious consideration. In 1899 the patient manifested a late syphilitic lesion on the upper lip, which baffled all form of local treatment, and was evidently diagnosed cancer by a quack, and removed, with a goodly portion of the lip, by means of a paste (Fig. 1). A second cancerous growth, with a goodly portion of the scalp, was removed by the same

[1] Jour. Am. Med. Assoc., July 13, 1901.

method from the back of the head (Figs. 2 and 3) in January, 1900, and a third was being removed from the throat in May, 1901, when the patient withdrew, perforce, from pain; the disease was then promptly recognized and arrested by proper treatment.

Case 2 occurred in C. R., aged 56 years, a man of intelligence and high social standing. A round, firm, very insensitive, sharply circumscribed mass, size of an English walnut, was diagnosed a gumma. His eldest child is a paralytic and

FIG. 7 (Case 10).—Ulcerating papular syphilide, wrongly diagnosed parasitic sycosis.

imbecile. The previous attending physician refused to concur in the diagnosis, because the patient denied a syphilitic infection, notwithstanding the condition baffled six weeks of simple medication, and yielded promptly to potassium iodide. Late manifestations on the face in cases with negative histories are often diagnosed and treated for months and years for lupus, furunculosis, sycosis, acne, etc.

Case 3 (Fig. 5), an ulcerating gumma of the nose in a woman aged 42 years, had been diagnosed lupus and treated

as such for more than a year. Mercury and potassium iodide effected a restitution to normal in four weeks' time. Perforation of the septum, gumma of the pharynx, and circinate cicatrices over the right knee afforded additional evidence of syphilis. Disease was ignored because history was absolutely negative.

Case 4 (Fig. 4), an annular syphilide of the nose and upper lip, of two years' duration, occurred in a maiden lady with negative history.

Cases 5 and 6 are gummata of the upper lip, and Case 7 an ulcerating papular syphilide of the nose and cheeks, which had been improperly diagnosed and treated for one condition or another for a considerable period of time. There was additional evidence of syphilis in the form of cicatrices or active ulcerations in each of these cases.

Case 8 (Fig. 6) was an extensive ulcerating papular syphilide involving a large area of the right shoulder and neck, of seven years' duration, which had been diagnosed and treated for lupus. Numerous cicatrices were also grouped over the face and lateral aspects of the neck.

Case 9, diagnosed furunculosis and treated as such for more than a year, occurred also in a maiden lady.

Cases 10 and 11 (Figs. 7 and 8) were diagnosed and treated for parasitic sycosis, barber's itch, and ringworm, yielding promptly to specific treatment, though intractable to antiparasiticides. The lesions extended to and involved the mucous membranes in the form of mucous plaques.

Case 12 was diagnosed acne vulgaris, and consisted of a group of firm papules situated over the forehead on an infiltrated base of boardlike consistence. Pustules and papules were indiscriminately mingled, and the appearance was not altogether unlike acne, save for the marked circumscribed grouping, infiltration, and absence of comedones. Mucous plaques, cicatrization, and other evidences of syphilis were present.

Case 13, of unusual interest, occurred in a man aged 45 years, of marked intelligence and social standing. The eruption, consisting of multiple ulcerating cutaneous gummata, began on the dorsal aspect of the middle finger of the left hand and gradually extended, for a period of two years, over the dorsal aspect of the hand and the extensor surface of the forearm beyond the elbow. Various diagnoses were established, the concurring opinion being that it was a tuberculous cutis. It was intractable to all forms of treatment, and the patient was subjected to the free use of escharotics, cauterization, and other drastic and painful measures; am-

putation of the affected member had been suggested. The ulcers were characteristically grouped, kidney-shaped, and infiltrated, and yielded completely, in five weeks' time, to potassium iodide and emplastrum hydrargyri. The history was negative, but the diagnosis was amply confirmed by a recurrence of the eruption on the leg, by gummatous manifestations on the leg of the wife of the patient, and hereditary evidence of the disease in one living child.

Late syphilitic manifestations are prone to occur on the legs in the form of ulcerating gummata, papulo-serpigenous

FIG. 8 (Case 11).—Ulcerating papular syphilide, wrongly diagnosed ringworm.

syphilides, pigmented or cicatrized; they are very characteristic, and therefore invaluable for diagnostic and confirmatory evidence.

Case 14 is an interesting example in an ignored case of a characteristically grouped, ulcerated, pigmented, papular syphilide on the left leg below the knee.

Case 15 is a marked example of a pigmented serpigenous syphilide on the same location, and though the history was absolutely negative, the diagnosis was amply confirmed by the hereditary evidences in the teeth[1] (Fig. 11) of one daughter, out of three otherwise normal children.

[1] Lancet-Clinic, October 20, 1900.

Case 16[1] (Fig. 10) is an extra-genital infection occurring in an eleven-year-old boy who, during the summer months, was employed in a large shoe factory. No special significance was attributed to the chancre on the lip, acquired from the use of a common drinking cup, and the roseola was diagnosed as heat eruption. The languor, general malaise, and physical and mental depression induced the parent to seek professional attention at a time when the eruption was fast dis-

FIG. 9 (Case 18).—Ulcerating gumma and deformed tibia in a case of hereditary syphilis.

appearing; otherwise the disease, for a time at least, would have remained ignored.

I believe that it is a growing impression that a large percentage of the cases of mental disorders in children is referable to syphilis in hereditary form. Case 17, neurasthenia bordering on insanity, in a seven-year-old child, occurred in an individual whose father had contracted syphilis to his knowledge before marriage, and has concealed the fact from

[1]Lancet-Clinic, November 3, 1900.

the members of his family and the neurologist who has been caring for his child. The father manifested a serpigenous syphilide of the scalp two years ago, and his wife a palmar syphilide one year ago, both manifestations presenting a characteristic appearance, and yielding promptly to specific treatment. That hereditary syphilis, which is capable of producing profound disturbances, is, in a measure at least, responsible for the nervous manifestations in the child, can scarcely be questioned.

FIG. 10 (Case 16).—Extra-genital chancre of lip. Roseola was diagnosed "heat eruption," and the initial lesion regarded as trivial (see *Lancet-Clinic*, November 3, 1900).

Case 18 (Fig. 9), Miss L. G., aged 13 years, is the fifth child of a family of eight children, the youngest of whom were twins. One of these died early in infancy; an elder sister has an interstitial keratitis; the family history, with the exception of a few obscure symptoms on the part of the mother and one or two of the children, is negative. Patient had an indolent, intractable ulcerating cutaneous gumma of the left leg, of two and a half years' duration, surrounded with pigmentations and cicatrices of earlier syphilides.

The tibia is very irregular and deformed from periostitis gummosa, still active over one or two areas. The child shows additional evidence of hereditary syphilis in the form of Hutchinson teeth and an interstitial keratitis.

The remaining cases are of ordinary interest, large, papular, and gummatous syphilides of no special significance.

FIG. 11 (Case 15).—Deformed (syphilitic) teeth, inherited from an ignored case, showing a marked pigmented, serpigenous syphilide (see *Lancet-Clinic*, October 20, 1900).

Since the above cases have been reported an additional case of unusual interest has presented itself. The patient, a man of intelligence and good social standing, presented a large papular late syphilide and mucous plaques, corresponding to an infection of about three years' duration, dating apparently to an extraction of teeth accompanied with

severe hemorrhage, which was controlled both by a dentist and an attending physician.

In conclusion, I am led to believe, from the study of the above cases, that it is fairly evident why the disease is so frequently ignored and what measures are necessary to avoid, in a measure at least, these occurrences.

Whenever practical, the diagnosis of syphilis should be established upon such fact and evidence that its validity can never be questioned. This will inure to the peace of mind of the patient, and will insure the employment of the best measure to prevent future ravages. Much harm and little good is effected by the establishment of a too early diagnosis, which often results in half-hearted diagnoses and treatments, if not completely ignored syphilis. Negative history plays a very important rôle as a cause of ignored syphilis, and is given entirely too much credence. This is especially true of acquired syphilis in women and hereditary syphilis in children. Extra-genital infection necessarily plays an important rôle as a cause of ignored syphilis. Finally, a large class of cases is due to faulty diagnosis, generally established early in the course of the disease, often at the time when an apparently trivial venereal lesion is dismissed without serious consideration. These and many other causes result in a large percentage of cases of syphilis being ignored.

XXVII. THE SEVERING OF THE VAS DEFERII AND ITS RELATION TO THE NEURO-PSYCHOPATHIC CONSTITUTION.

By H. C. SHARP, M. D.,
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The masterly labors of Galton and Ribot have established the fact that a general law of heredity obtains in the mental as well as in the physical life. The influence of this law is undisputed in forming the character of intellect, will-power, and control of the appetites and passions. In its supreme ascendency are included all the moral impulses, either normal or abnormal, and the pathological condition to which the physical and mental life are subject.

Testimony is conclusive in establishing this diathesis, in which chorea, hysteria, hypochondriasis, inebriety, imbecility, criminality, and insanity are its chief manifestations. However, I do not wish to be understood that all persons of this constitution are useless creatures, a burden to themselves and a charge upon society, for included within its subjects are to be found the most gifted as well as the most vicious, weakest, and ordinarily the most unhappy of mankind. Chatterton, Goldsmith, Burns, Steele, Coleridge, Charles Lamb, and Cowper are instances of this perverted organic disposition. Dr. Folsom doubts if the compensation to society of such members of this family as Byron, Burns, De Quincey, and others is equal to the loss and injury sustained through the acquisition of the men and women who become the inmates of our prisons, insane asylums, and almshouses and destroyers of home peace, and he quotes Clouston as saying that the world would be better off to lose the comparatively few ill-balanced geniuses, the hundreds of impractical, unwise, talented men and women, along with the

thousands of people who can not get on and either become a public charge or a menace to society.

Such men of genius, such exalted originals in mind, who tower above mankind, have no fathers and leave no sons; they leap from obscurity, as it were; you know nothing of their ancestry, likewise nothing of their posterity. But if you were to take the roll of the prisons, insane asylums, and almshouses you might establish the family tree.

Coleridge's father was an opium eater, the son himself a genius, notwithstanding his brother thus wrote of him when he was young:

"A certain infirmity of will has already shown itself; his sensibilities are intense and he has not wherewithal to control it. He can not open a letter without trembling. He yields, as it were, unconsciously to slight temptations—slight in themselves and slight to him—as if swayed by a mechanical impulse apart from his own volition. It looks like an organic defect; a congenital imperfection."

The individual's higher brain centers are inhibited, and he dashes about like a ship at sea without a rudder—fairly well if the winds are fair and the sea calm, but depending upon the elements for the character and time of the inevitable wreck. Invention, music, and art are sometimes of high order among these persons, but desultory, half-finished work and shiftlessness are decidedly the more common. Concentrated, sustained effort is impossible, and an attempt to keep them at it results disastrously. Executive or business faculty and judgment are seldom developed.

As a further evidence of mental heredity, let us take the perfectly healthy mind. Allow me to cite to you the families of Aristotle, Bacon, and James Watt among the scientists, and among men of letters the families of Addison, Thomas Arnold, Macaulay, and Madame de Staël; or let us follow the family of one of America's familiar names, Adams —John Adams, second President of the United States; John Quincy Adams, sixth President of the United States; Charles

Francis Adams, Minister to England; C. T. Adams, scholar and statesman; J. Q. Adams, son of C. T. Adams, student of social problems.

Ribot says: "The law of heredity I make no effort to establish: I assume it. It is not doubted by careful students of human nature any more than by students of biology. The mistake should not be made of supposing that it is a new discovery, one of the as yet unproven hypotheses of modern science, or that we owe our knowledge of it to Charles Darwin, August Weisman, and a few other scientists. These men have indeed done much in the field of research, but heredity has been recognized as a most potent force in the development of life as long as history has been written." The quaint old Anatomist of Melancholy, Burton, in his sixth edition, published in 1652, very truly writes at the end of his chapter on Inheritance of Defects: "So many several ways are we plagued and published for our fathers' defects, insomuch that Fernelius truly saith: 'It is the greatest part of our felicity to be well born, and it were happy for human kind if only such parents as are sound of body and mind should be suffered to marry.' An husbandman will sow none but the best and choicest seed upon his land; he will not rear a bull or a horse except he be right shapen in all parts, or permit him to cover a mare except he be well assured of his breed. We make choice of the best rams for our sheep, rear the neatest kine, and keep the best dogs, *quanto id diligentius in procreandis liberis observandum!* And how careful, then, should we be in begetting of our children! In former times some countries have been so chary in this behalf, so stern, that if the child were crooked or deformed in body or mind they made him away. So did the Indians of old by the relation of Curtius, and many other well-governed commonwealths according to the discipline of those times. 'Heretofore in Scotland,' saith Hect Boethius, 'if any were visited with the falling sickness, madness, gout, leprosy, or any such dangerous disease which was likely to be propagated from father to son, he was instantly gelded; a woman kept from all company of men; and if by chance, having such disease, she were found to be with child, she, with her brood, were buried alive'; and this was done for the common good, lest the whole nation should be injured or corrupted. A severe doom, you will say, and not to be used amongst Christians; yet more to be looked into than it is. For now by our too much facility of this kind, in giving way

for all to marry that will, too much liberty and indulgence in tolerating all sorts, there is a vast confusion of hereditary diseases; no family secure, no man almost free from some grevious infirmity or other, when no choice is had but still the eldest must marry, as so many stallions of the race; or if rich, be they fools or dizzards, lame or maimed, unable, intemperate, dissolute, exhaust through riot, they must be wise and able by inheritance. It comes to pass that our generation is corrupt, we have many weak persons both in body and mind, many feral diseases raging among us, crazed families; our fathers bad, and we are like to be worse."

How forcibly this impresses us if we stop to observe the rapid proportional increase of dependants. Take the criminal class alone for the past fifty years. We find that in 1850 there were 6,737 criminals in the United States, or one to each 3,442 of the population; while in 1890 the penal population is shown to be 83,329, or one to each 957 of the population. This is of the criminal alone. If all dependants were considered, such as inhabit public and private insane hospitals, almshouses, and feeble-minded institutes, we would find the proportion to be in the neighborhood of one to three hundred of the population. This is most alarming, and surely calls for a most heroic method of treatment. The condition has come about notwithstanding the relentless labor of such eminent sociologists as Gall, Lombroso, Benedict, Ellis, Brockaway, and others who have been well supported by statutory law and liberal appropriations to carry into effect the reformatory methods suggested by them.

This condition obtains only in the human species, since practically all other animal kind protect themselves or are protected by putting to death those weaklings that are unable to weather the storm, and others that appear peculiar are castrated, and none but the perfectly healthy are left to reproduce their kind.

It is altogether probable that we, through our spirit of humanity, our broad ideas of liberty and individual right, have gone too far in this direction for the good of the entire race. Many scientists, realizing the true condition, have

offered a means, namely, castration, that would eventually overcome this unfortunate condition; but each time they have been overruled and driven back by public sentiment. In fact, F. Hoyt Pilcher, Superintendent of the Asylum for Idiotic and Imbecile Youth, of Kansas, went so far as to castrate forty-seven of his inmates, and claimed as a result of the operation (as far as the patients themselves were concerned) a marked physical and mental improvement; in fact, he reports one case so much improved that he was discharged from the institution and is now making a full hand on a farm.

I believe, however, that castration will never become popular, nor do I believe it justifiable, for the method employed to render these unfortunates sterile should not in itself be a punishment to the individual—it must not result in a deformity, neither must it interfere with his enjoyment of life. The strongest argument against the advocacy of castration has been that it practically destroys the future enjoyment of life, and that the knowledge of the patient that he is deprived of sexual power has a very depressing effect.

This is not true of the operation referred to in the title of this paper. Dr. Ochsner, of Chicago, says in speaking of this operation, which he has twice performed for diseases of the prostate: "Judging from the results obtained in the two cases reported, it is evidently possible to obtain sterility without in any way interfering with the possibilities of future enjoyment." Dr. Ochsner, in an article published in the Journal, April 22, 1899, entitled "Surgical Treatment of Habitual Criminals," suggests that this operation may become a popular means of preventing the propagation of criminals, but fails to mention the other manifestations of the above diathesis. Dr. Daniel Brower, of Chicago, in his very excellent paper entitled "Medical Aspects of Crime," read before the American Medical Association in 1899, says in speaking of this operation that "it does not mutilate the person, it does not destroy his sexual power, but it does

prevent his power of propagation; and it is an operation attended with very little risk to life, and in my judgment it may be made a most useful agent in preventing an increase in criminals."

After having personally severed the vas deferii in forty-two cases, whose ages range from seventeen to twenty-five, I am prepared to speak most favorably of the operation, and state positively that it does not impair the sexual power of those operated upon; that they improve mentally and physically in that they increase in flesh, feel that they are stronger, sleep better, their memory improves, the will becomes stronger, and when prior to the operation they made no advance in school, now their advance is fairly satisfactory. As time presses, I will give but one case, but what is true here is largely true in all.

This case was a boy 19 years of age, operated upon October 11, 1899. He was born in Missouri of criminal parentage; had masturbated since twelve years of age. He was very dull, unable to make favorable progress in school, and mental concentration was impossible. He attributed his mental condition to his excessive masturbation, and applied to me for relief. Sixty days after the operation he had gained twenty-two pounds, felt well, claimed that erections were even more vigorous than they were prior to the operation, and believed that I had performed the operation simply for the purpose of deceiving him, and requested that I perform castration. One year following the operation his weight had increased thirty-eight pounds, his mental condition had greatly improved, and he had ceased to masturbate. Upon questioning him he claimed, using his own words, that "The desire is as great as ever, but I have the will to resist."

The method of operation I formerly used was the one suggested by Dr. Ochsner: Disinfecting over the external inguinal ring; infiltrating the tissue with a two-per-cent. sterile solution of cocaine; making an incision in the direction of and directly over the cord about an inch long, down to the vas deferens, clearing it for about half an inch; ligating at nearest point to seminal vesicle, letting the testicle

end go free; removing about one fourth of an inch of the vas; closing the wound with buried stitch. Latterly I have been following the English method, which selects the scrotal region as the site of operation. They clasp the vas between the thumb and index finger, make a longitudinal incision about three eighths of an inch in length, and sever the vas, thus ending the operation, as they do not close the scrotal wound.

It is my judgment, founded on research and observation, that this is the rational means of eradicating from our midst a most dangerous and hurtful class. Too much stress can not be placed upon the present danger to the race. The public must be made to see that radical methods are necessary. Even radical methods may be made to seem just if they are shown to be rational. In this we have a means which is both rational and sufficient. It remains with you—men of science and skill—to perpetuate a known relief to a weakening race by prevailing upon your legislatures to enact such laws as will restrict marriage and give those in charge of State institutions the authority to render sterile every male who passes its portals, whether it be almshouse, insane asylum, feeble-minded institute, reformatory, or prison. The medical profession has never failed in an attempt, and they will not fail in this.

DISCUSSION.

DR. A. J. OCHSNER, of Chicago, Ill.—Mr. President: Inasmuch as Dr. Sharp has quoted from a paper of mine, I wish to say that the patients I operated on are still perfectly normal, as far as their ability to enjoy sexual life is concerned. I heard from one of them only a few weeks ago, and the other one some time ago. Since that time I have performed the operation on a number of patients; that is, I have removed tubercular vasa deferentia(double), and I have found that in no case has there been any disturbance or interference with the ability of the patient so operated on to enjoy sexual intercourse. With this method we have a means of protecting society against hereditary criminals. We do the patient no harm. I wish to make one explanation, and that is in regard

to the fact that many of these patients doubt that the vas deferens has been severed, on account of the presence of what they consider to be seminal fluid. Of course, it is simply an accumulation in the seminal vesicles, but it contains no secretion from the testes. It seems to me that when we have a means which is perfectly safe, which is unaccompanied with pain, which leaves no deformity, which leaves the patient precisely as good as he was before, with the exception of disabling him from inflicting his progeny on the community, the medical profession should quietly develop this subject, and I believe we could do more in this direction than we could in taking care of those who are afflicted in this way. I believe the reason why the proportion of criminals and paupers is increasing so rapidly in this country is because they are fed so well. They do not die the way they do in other countries, where there is not so much food. If we feed them well, they will continue to increase more rapidly unless we stop them from procreating.

DR. SHARP (closing the discussion).—I wish to emphasize the absolute necessity of urging on the medical profession that the most radical methods be brought about for the purpose of eradicating this diathesis. If any of you will take pains to observe and study the matter of inherited criminality in any of its manifestations, insanity or pauperism, whatever character it may assume, I am sure you will be convinced that it is only a matter of time when we will get such a burden upon the citizens of our nation that it will be impossible to take care of them, and it will be a great hardship upon the properly balanced and intellectual classes.

One thing Dr. Ochsner spoke of was the amount of fluid ejaculated by these patients after severing of the vas deferens. I was surprised at the quantity. I should say in some cases there were from fifteen to twenty minims of fluid, but it was thin and more watery, of course, than the normal semen. I have repeatedly examined this secretion for spermatozoa, and always found them absent.

XXVIII. SURGICAL TREATMENT OF PALATAL DEFECTS.

By TRUMAN W. BROPHY, M. D., D. D. S., LL. D.,
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It is to the credit of the dental profession that the first operation for the closure of cleft palate, according to the history of this surgical procedure, was proposed in 1764 by a dentist. Inseparably associated with staphylorrhaphy is the name of the dentist LaMonier, the Frenchman who first believed that this most conspicuous and distressing deformity was amenable to successful surgical treatment.

Fifty-five years after LaMonier proposed to close the palate by surgical methods, Roux, of Paris, in 1819, was the first to methodize and publish rules to be observed in the performance of these operations. To our profession, then, is due the honor of the suggestion of the operation, and to France in particular, through the efforts of Roux, for successfully carrying it out. In 1820 Warren, of Boston, U. S. A., without a knowledge of Roux's work, brought before the profession a similar but somewhat modified operation, which was favorably received and adopted by many leading surgeons throughout the world. During a period of about twenty-five years this operation was performed by such distinguished surgeons as Graefe, Sédillot, Dieffenbach, Liston, and Pollock, of Europe, and the younger Warren, Wells, Mattauer, Stevens, Gibson, Hossack, Mutter, and Pancoast, of America.

In 1844 Sir William Fergusson, of London, devised a new operation. He recognized that the tension on the sutures was followed by their cutting out and the consequent failure of the tissues of the opposite sides to unite. To relieve this tension Fergusson resorted to myotomy, dividing the levator palati, the palato-glossi, and palato-pharyngei muscles. It

was found that Fergusson's operation was not so frequently followed by the sutures cutting out, and consequently it became popular. Sixteen years later, in 1860, Dr. Agnew, of Philadelphia, pointed out that the action of the tensor palati muscle drew the newly approximated surfaces of the soft palate apart, causing the sutures to cut out, with failure of the operation. To relieve this tension Dr. Agnew divided these muscles at their constricted parts, as they passed over the hamular process of the sphenoid bone, thus relaxing the tension upon the soft palate and causing the sutures to less frequently cut out.

While the efforts of the distinguished surgeons named have made it possible to avoid many of the failures resulting from the sutures cutting out and the edges of the segments separating, the methods here described, which are by no means theoretical, but are based upon clinical experience extending over a period of twenty-five years, make myotomy nearly always unnecessary. The formation of cicatrices following incisions renders the soft palate thick and unyielding, so that its function is performed imperfectly. It matters not to what extent the surgeon divides, by incisions, the hard palate in closing the cleft, as its function is not to retract and vibrate, but to serve as an immovable arch, as a factor in articulation; hence cicatricial tissue here does not in any way disturb function. The soft palate must not be made stiff, thick, and clumsy by the forming of scar tissue in considerable quantities in its substance. In addition to this objection, the tensor palati muscle once completely divided at the hamular process of the sphenoid bone never unites, as the segments of the muscle immediately retract and separate so widely as to prevent subsequent union.

The tensor palati muscle arises from the scaphoid fossa of the sphenoid bone and the cartilaginous portion of the Eustachian tube. It is directed downward, then reflected over the hamular process, and passes forward to be inserted into the anterior surface of the soft palate. Its action is to

render the soft palate tense and to dilate the Eustachian tube. It must have been observed by all operators of considerable experience that when the tension of the palate is relieved by dividing the tensor palati muscle defective hearing frequently follows. This is due to the destruction of the continuity of the tensor palati muscle and consequent failure of the pharyngeal opening of the Eustachian tube to dilate normally.

A statement appears in the late Professor Garretson's work which is in accord with the views of most authors on the subject under consideration: "In looking over the history of staphylorrhaphy the reader will be struck with the likeness in complaints, the three principal of which seem to be the difficulties in tying the sutures, their great tendency to cut out after they are once nicely secured, and the concealment of the parts during the operation, both because of deficiency in light and the accumulation of the viscid mucosaliva which in mouths thus affected is secreted in great abundance." Further he states, "As generally practiced it is rather difficult of performance, and so frequently unsuccessful that surgeons seem disposed to avoid the responsibility of it."

The difficulties attending the closure of the soft palate may be, to a very great extent, overcome by making use of the method which I here describe, and which is adapted to the treatment of patients whose bones are well ossified and whose deciduous teeth are erupted. The method of operating on children under six months of age will be described. Delicacy of the tissues and the tendency of the sutures to cut out suggested that a modification of the quill suture, long ago introduced, would aid us materially in preventing the cutting out of the sutures after performing the operation of staphylorrhaphy. Inasmuch as lead is tolerated so well by the tissues, I have employed it for this purpose.

The first step to be taken in the closing of fissure extending through the palatal plates of the maxillary bones is to make use of the curved periosteotomes. I designed these periosteotomes of different sizes and different angles so as to

meet the requirements of individual cases. Divide the mucous membrane at the border of the cleft and elevate all the soft parts from the hard palate, including the periosteum.

Having thus denuded the hard palate of the periosteum, the next step will be to pare the edges of the cleft throughout the entire length of the soft palate as well as of the soft parts removed from the hard palate, dividing also the membranes at the distal surface of the horizontal plates of the palate bones. These membranes cover also the nasal surface of the palate bones, and extend down to form the superior distal surface of the soft palate. This done, the soft parts readily fall together, and the surgeon sees that there is *no necessity of making lateral incisions into or through the palate*; moreover, the danger of non-union just at the termination of the hard palate is very materially lessened, and the holes which we frequently find after operations in the location named are almost invariably avoided. Oftentimes the splitting of the border of the soft palate, especially in cases where this tissue is quite thick, I have found serves every purpose, as the mucous membrane divides and furnishes sufficient freshened surface of muscular tissue to enable us to get good union, and we thereby avoid the removal of any tissue whatever in this part of the palate, which is oftentimes very desirable. The height of the dental arch by this operation will be necessarily lowered to some extent. The space left between the bone and the muco-periosteal tissues in their new place will be filled with granulations, and the exudate from the periosteum will produce new bone, so that we have a new hard palate formed by this operation.

After the edges of the cleft are well freshened a properly formed needle (Deschamp's), curved after the fashion of the gynecologist's needle, is employed, with which to introduce silk sutures, four of which are carried through the tissues, and these are substituted by No. 22 silver wire sutures; then the lead plates, No. 22 American gauge, are perforated with holes corresponding to the number of sutures to be em-

ployed, shaped so as to extend from the anterior margin of the fissure back to the distal border of the soft palate, and bent to conform to its shape. The wire sutures are then passed through the holes and twisted together. Before the lead plates are fixed in place as a matter of convenience coaptation sutures should be introduced, but not tied until tension is exerted by means of the wire sutures and lead plates upon the divided portions of the palate, and their edges approximated. After the edges of the palate have been approximated, the silk coaptation sutures may be tied to hold the approximated edges in close contact and thus secure immediate union.

The advantages claimed for this method of procedure are:

1. The prevention of the cutting out of the sutures, since the lead plates coming in contact with the soft palate exert pressure thereon, and consequently the tension is not made by the sutures alone, which exert pressure on so limited a portion of the tissue, but it is upon the entire length of the palate covered by the lead plates.

2. The lead plates serve as a splint, rendering the palate inflexible to a very great extent. The movements which are almost constant are suspended; the active muscles are put out of use until union of the cleft may take place. After using this method of closing the soft palate, I feel confident that better results can be secured than by the employment of sutures alone. As previously stated, this is not to take the place of the operation of dividing the bones at the malar process and carrying the greater portion of the maxillary bones together, but it is adapted to the treatment of patients whose bones are well ossified and whose deciduous teeth are well erupted. It is in such cases that I recommend this operation.

Lengthening the Palate by Surgical Methods.—In cases where the palate has not a sufficient length to perform its functions after operation, this defect may be overcome by making use of the palato-pharyngeal muscles. These mus-

cles are usually developed far more than normally, and may be seen as broad, flattened bands of muscular tissue, extending from the palate downward and outward, to be inserted into the posterior part of the thyroid cartilage. By utilizing two thirds of each muscle and bringing them to the median line and uniting them, the palate may be lengthened to almost any extent required.

After a careful study of normal palates I reached the conclusion, some time ago, that many of them are not long enough to close the post-pharyngeal opening during articulation, and yet in such cases speech is clear and distinct. Short palates, therefore, can not be the sole factor in causing the nasal accent or defective speech.

In an article on "Congenital Cleft Palate," by Dr. Kirmisson, professor of the Medical Faculty of Paris, chief surgeon of the Trousseau Hospital, and a corresponding member of the American Orthopedic Association, translated from the French into German by Dr. Karl Deutschlaender, assistant to the Royal Surgical Clinic of Greifswald, and composing a chapter of his work on "Congenital Deformities," he enters into a description of the methods of operating, with details and technique of the surgery of the palate, in a most thorough and complete manner. On the question of the length of the palate as a factor in distinct articulation, Professor Kirmisson states:

"Passavant ascribed the imperfect articulation after staphylorrhaphy to the shortness of the soft palate, which could not approach the post-pharyngeal wall. J. Carl has proven this to be erroneous. He bases his statements on cases in which there has been a complete union of the soft palate with the pharyngeal wall. In these cases he also was able to observe the nasal character of the voice. Absence of proper innervation and deficient development of the muscles have been given as causes. Trélat mentions especially the shortness of the vault and deficient development of the superior maxillary bones. This nasal character of the voice, he says, is noticed in all cases, notwithstanding the plastic operation, where the vault and

soft palate are shortened, and a prosthesis can not remedy this difficulty. Aside from the causes due to mal-development, there is another much more universal one—namely, lack of practice."

He further says: "The surgeon should always bear in mind the most desirable age for operating. There is much discussion on this point. Before the employment of chloroform the operation was necessarily delayed until the child became old enough to understand the operator's instructions. Thus Roux put it at sixteen years; Augenbach and Trélat operated at seven years of age. At the French Surgical Congress in 1889 Ehrmann reported his results of early operations. He operated upon ten children under two years with six good results, two deaths, and two failures; twenty children between the ages of two and six underwent operation, with seventeen good results, two deaths, and one failure; lastly, eleven operations between the ages of seven and ten showed ten good results, with one failure.

"These results speak against operations performed during the years of early childhood. In following each case which had undergone operation at an early age, we find that a large percentage die from other causes. Therefore, I believe the following to be true: Operations at a very early date seem to weaken the child's general condition to such an extent that it is unable to resist the severe diseases of childhood. Furthermore, it seems, judging from casts made from Ehrmann, as if the early operation impeded the development of the vault, and the resulting contour seems to be less satisfactory than in cases of late operations. Nevertheless, J. Wolff, of Berlin, recommends early interference, and unhesitatingly operates on children of from one to two years old. I have not had an opportunity to see Wolff work. I must confess, however, that notwithstanding his excellent operative technique and the employment of his tampon, operating at this early age strikes me as difficult and dangerous. The field for operation is too small,[1] the tissues thin, the sutures, therefore, easily cut through. Further, there exists the danger of severe hemorrhage; and, lastly, it is almost impossible to successfully follow the rules of antiseptic asepsis. Therefore I strongly recommend operating between the fifth and sixth years."

Notwithstanding the belief expressed by the celebrated French surgeon, I am convinced—after making 570 oper-

[1] This statement of Professor Kirmisson is an argument in favor of postponing the operation on the lip, so as to enable us to get the benefit of extra room which the opening of the lip affords us.

ations for the cure of cleft palate, of which 211 were upon children younger than six months, the others being from six months to 52 years of age—that *the best age to select for operating is within three months after birth.* Of the children under six months, no death occurred. Two deaths followed operations upon children three years of age, one of which I am confident resulted from failure of proper care. Of the whole number of operations, two died, as above stated.

Dr. Kirmisson states that Ehrmann operated on ten children under two years, with six good results, two deaths, and two failures, but he does not state that children within three months after birth were operated on by any of the surgeons named. After relating the results of the operations of the various surgeons quoted, Dr. Kirmisson further says: "These results speak against operations performed during the years of early childhood; besides, we find that a large percentage die from other causes."

Operations in Early Infancy.—I am but too well aware that the methods that I pursue are not generally practiced, and that they have been criticised by those who do not fully comprehend them. It is gratifying, however, to realize that many of our most distinguished surgeons who formerly questioned my method are now most enthusiastic advocates of it.

The question of early operations has with me passed the experimental stage. I will confess that my first cases were undertaken with a great deal of hesitancy. I knew that I was transgressing all the long-accepted rules of surgical procedure, but it seemed to me so reasonable that the patient should be able to undergo the necessary trial that I ventured.

We know that the struggle of birth is often more severe than is this. There are sometimes misplacements and replacements of the cranial bones during this critical natural process, more radical than that of bringing into apposition the separate bones of the maxilla. It has been the observation of every obstetrician that injuries which the child sus-

tained during parturition produce little immediate or ultimate injurious results.

My experience in operations performed for the closure of cleft palate, at from ten days to three months of age, has more and more confirmed my opinion and justified the practice. I believe in operating at as early an age as practicable after birth, usually within the first three months. My reasons are as follows, and in stating them I am, in the light of my own experience, compelled to express views quite the reverse of Professor Kirmisson's:

1. The surgical shock is less, because the nervous system of a young child is not well developed, and it is not, therefore, capable of receiving the same impressions that it would later in life, for young children usually react better. Moreover, all mental apprehension is eliminated—and we all know that alarm and dread are among the most powerful factors in producing shock.

2. Before the bones are fully calcified they may be bent or moved without fracture. Bone at birth is about one half organic matter, hence the injury is really less in closing a cleft than it would be if the calcification were more complete.

3. If the muscles are very early brought into action, they develop instead of atrophy, and hence a good velum is secured, with plenty of tissue; whereas, if the operation is undertaken later in life, after the parts are shrunken through non-use, they can rarely be made to subserve the same purpose that organs which develop through natural employment can be made to do. It is well known that muscular tissue is more perfectly developed through action. In instances of cleft palate, none of the muscles of the velum can be normally employed when the parts are not united, and hence they remain in an immature condition through life, even when an artificial substitute is inserted. By operating at a very early age they are at once brought into use, and their development is proportioned to that of other tissues.

4. When the palatal processes of the maxillæ are united, it will be observed that the development of the bones of the alveolar processes of the upper jaw assumes a form nearly or quite normal, and, when the teeth are erupted, they will properly occlude with the lower ones, or nearly so. In my first case the breadth of the jaw was reduced about three fourths of an inch.

It was predicted by my surgical friends that the upper jaw would be much narrower than the lower one, and that it must always remain contracted; besides, when the teeth in the upper jaw were erupted they would be considerably within the arch of the lower ones. My answer was, that later on probably it might be within the province of dentistry to cor rect that by orthodontial methods. It must have been ob served by every painstaking student of this deformity that in nearly all cases there is sufficient tissue in both hard and soft palates, but the parts are not united.

This failure of union causes the superior maxillary bones to spread farther and farther apart, until the arch is widened far beyond the width of the lower jaw.

The method here described enables us to restore in early infancy the normal relations of the superior maxilla, and consequently the proper relation of the upper to the lower maxillary bones. In patients not having sufficient bony tissue to enable me to close the cleft by this operation without contracting the arch, I found, rather to my surprise, that as time went on the bones developed and the arch spread until, when the upper teeth were erupted, they occupied nearly or quite the normal relation to the lower ones.

5. Following early operations there is much less deformity, for all the tissues, bony as well as soft, develop naturally and according to accepted types. When the operation is postponed for a few years, it is very difficult to secure such results.

6. When the operation is made in early infancy, the parts are sufficiently advanced to give possibility for normal

speech when the time comes for learning to articulate. If the operation is not made until faulty habits are acquired, it is with difficulty that they can be overcome, even supposing the muscular parts could be made sufficient. The methods of procedure in operating for the closure of the cleft are as follows: The patient should be properly prepared; the mouth thoroughly irrigated with antiseptic solutions; the patient placed on the operating table with the face toward the light, and after administering chloroform introduce the oral speculum and thoroughly remove the edges of the fissure.

A mere scraping of the mucous membrane is not sufficient to enable us to bring about union which will be permanent and satisfactory. Trim the opposing edges of the bone as well; it will secure a sufficient exudate, so essential to a perfect union, to make the operation successful in this respect at least. The knife will easily cut through the soft bone of the hard palate as well as the alveolar processes of young patients. Then raise the cheek, and well back toward the posterior extremity of the hard palate, just back of the malar process and high enough to escape all danger of not being above the palate bone, insert a large braided silk suture, carrying it through the substance of the bone to the central fissure by means of one of the strong needles, with the opposite needle carrying a corresponding suture through the opposite side. We then have two silk suture loops carried to the center of the cleft, and passing one loop through the other enables us to carry the one loop through both of the maxillary bones.

The silk is more easily introduced by the needle than wire, but a silver wire should always be substituted for it and drawn through to take its place. The wire should be No. 20, and may be doubled in case the condition of the parts and the tension upon the tissues necessary to approximate them seem to require it. Nearer the front portion of the maxilla insert another wire, carrying it through the substance of the bone above the palatal plate, and through the

outer side in a position corresponding to the place of entrance. Thus we will have one wire passing over the palate in front of the malar process of the bone and another behind it.

The next step is to make lead plates (No. 17, American gauge) to fit the convexity of the buccal surface of the bones. Have them provided with eyeholes, through which are passed the protruded ends of the wire upon each side. Twist these together; that is, the right end of the posterior with the right end of the anterior wire, and the same on the left side. These form heavy tension sutures, and the parts when once approximated by their use can not be separated, as *the sutures do not cut out.* If the cleft is a very wide one and we are not able to close it by twisting the wires together upon the lead plates, force may be exerted with the thumb and fingers, or by means of a forceps designed for that purpose. If, by such force, the edges of the cleft do not approximate, there is a further step to be taken which will obviate these difficulties. After the cheek is well raised, divide the mucous membrane and the bone through the malar process. Carry the knife in a horizontal direction, and when well inserted sweep the handle forward and backward. In this way a maximum amount of bone and a minimum amount of mucous membrane will be divided. This done on either side, the bone can readily be moved toward the median line. The wire sutures passing through the lead button may now be again twisted, and the cleft of the hard palate be closed by approximation of the two sides.

The incision of the mucous membrane must be made as small as possible, as this membrane must serve to retain the bones in proximity or to hold them nearly together. If, after the parts are approximated, they are kept antiseptically clean, or as nearly so as possible, they will unite kindly and the palate will be formed so that its full function will be established. Separation of the bones is attended with very little hemorrhage, and the parts do not, as a rule, cause more

inconvenience to the patient than the ordinary operation of lifting the hard palate according to the practice of Sir Willian Fergusson. Should hemorrhage require attention, it is easily controlled by the application of sponges wrung out of water at about 170° F. These hot sponges, held in contact with the bleeding surfaces a very few minutes, will be all that is required.

The germs of the teeth are sometimes disturbed, and I have found occasionally certain teeth imperfectly developed when erupted.

The palatal arch is in some cases contracted, but this will not be permanent, for if the operation is performed early enough, when development is complete the teeth of the upper jaw occlude naturally with those of the lower jaw. It is a well-known fact that the alveolar processes develop with the teeth, and this seems to be a pronounced factor in the formation of the jaw and the guiding of the teeth into their proper position.

After the approximation of the edges in the manner that I have described, the parts should be thoroughly dried, the edges of the cleft carefully examined, and if need be some fine silk sutures inserted here and there to insure the perfect coaptation of the parts. These coaptation sutures formerly used by me in the closure of the hard palate in young children are now seldom employed.

The after-treatment is very simple, consisting solely of antiseptic cleanliness of nose and mouth, at least twice a day; stimulants, if indicated, the first twenty-four hours; preventing the child from disturbing the parts or introducing into the mouth anything that might interfere with the sutures; paying special attention to the care of the bowels; using alcohol sponge baths if the temperature rises above 100° F., and nourishing the patient on liquid food given by means of a spoon. The nipple should not be used, as the act of sucking may interfere with the process of repair. Abrasions of the mucous membrane caused by the lead plates

need not disturb the operator, for they are usually slight. The plates are to be left in place from two to four weeks, but the silk sutures, if employed, should be removed about one week after the operation. Through a misconception of this surgical procedure it has been stated that the closing of the palatal vault, carrying of the bones together and uniting them in the median line, would be followed by stenosis. If one keeps in mind the anatomy of the parts, and then understands the details of the operation, he will readily see that the closure of the nasal passage or even reducing its dimensions would be impossible.

I firmly believe that the operation should be made upon the palate before that upon the lip. It is a great mistake to commence at the oral opening and partially close the only aperture through which a subsequent palate operation must be made. The surgeon needs all the space that can be secured, which is none too much in a small child. The lip operation is comparatively simple and trivial, and it can be performed at any time; but the palate operation is made much more difficult if prior to that the lip has been closed. Should the intermaxillary bones protrude, they must not be removed, but should be carried back into their normal position. This may be done by removing a V-shaped piece of bone from the vomer.

After the palate has been closed and the protruding bones have been fixed back in their proper place by silver sutures and have united, *and not until then*, the operation of closing the double hare-lip should be made. Believing that it would be of interest to the profession, I exhibited at the meeting of the National Dental Association of the United States of America, in August, 1899, several patients upon whom I had operated.

The first patient was one upon whom I operated when she was ten days old. In this case we had a double hare-lip and a wide cleft of both the hard and soft palates. The palate was closed throughout its entire length at one oper-

ation. The tissues assumed a normal relation and form. The arch is now of normal width and the occlusion of the teeth is fairly good, though not quite normal, but by employing means well known to dental practice these teeth can be forced a little farther out so as to properly occlude with the lower ones. The fissure of the lip extended into the nostrils; the intermaxillary bones and the central portion of the lip were rudimentary. The lip, therefore, was formed by utilizing the tissue lateral to the fissures. An improvement in its appearance is yet to be made by removing some of the integument and reflecting the mucous membrane upward, thus shortening the lip. The child is now eleven years old, bright and healthy, and speaks perfectly.

The next patient exhibited was a child three months old. I operated for closing the hard palate when the child was three weeks old. I exhibited a model of the parts as they were prior to the operation; it was by no means an ordinary case. The opening was unusually wide, and the amount of tissue present comparatively small. On examination of the patients at the meeting named it was seen that the hard palate was completely closed, the parts being in perfect apposition and united. The opening through the lip gave good access to the parts, and the operation was performed with greater ease because of it. This little child was a brother of the girl exhibited. It is interesting to note in this connection that of the six children born to the parents of these two, four of them were defective in this particular. The oldest one was healthy, and no evidence of the deformity existed, even to the slightest degree. The second was afflicted with double hare-lip and cleft palate; the third, with hare-lip; the fourth, with double hare-lip and cleft palate; the fifth was normal, and the sixth, with single hare-lip and cleft palate. The deformities in these children, in addition to many other cases, have confirmed my opinion that many such cases have an hereditary origin, the paternal grandfather of these children having been similarly afflicted.

In the case of a child operated upon by me June 25, 1900, I learned that the father's brother, an uncle on her mother's side, and also an uncle on her father's side had cleft palate. Although the parents have normal palates, their oldest child had hare-lip, but this palate was normal, and the second and only other child had the double deformity.

Résumé.—1. Longitudinal incisions through the soft palate made for the purpose of relieving tension are not only unnecessary, but are injurious to the palate and its functions.

2. Lead plates fixed with silver sutures serve as splints in adults and children over six months old; besides, when this method is employed sutures do not cut out.

3. Short palates following operations or from other causes may be lengthened by surgical methods, and the voice restored.

4. The most favorable time in life for operating is between the ages of two weeks and three months.

5. The rigid stiff palate following operations is due to two causes, both of which should be avoided. First, failure to lift the soft parts from the hard palate, thus lowering the vault and lengthening the palate, and, second, the making of incisions through the palate to relieve tension.

6. The parts must be thoroughly irrigated and carefully watched and cared for until union is complete.

XXIX. FRACTURES.

By E. B. SMITH, M. D.,
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The onward progress in surgery has shown itself in the special field of fractures. Each of us to-day is making a more accurate diagnosis in our fracture cases, so the treatment is more intelligent as well as more simple. With anesthesia, antiseptics, and the Röentgen ray the diagnosis may be made positive, excepting in the rarest of cases, and appliances used or operative measures resorted to with assurance of good results. The skiagraph is of the greatest aid where there is swelling, tenderness, and effusion about a joint. Where there is subluxation, with doubt as to a fracture complication, and where there is a possibility of an epiphyseal separation, the X-ray is invaluable.

The first definite treatment for fractures was extension and counter-extension. Several assistants were employed to pull at each end of the fractured bone, and when this was not sufficient to bring about apposition, pulling appliances were brought into action. It can readily be seen what damage would be done the soft parts, besides increasing the shock.

In the old treatises on fractures we find many valuable points, and the literature is well worth reading. We find there some very indefinite rules on the diagnosis of fractures. One authority says that the fracture will be found where the trauma is seen and where the patient complains of pain. Another says: "Fractures are most frequent during cold weather." Benj. Bell, in his System of Surgery, Vol. 4, dated 1791, in speaking of the diagnosis of fractures, says: "The age and habit of the body of the patient, the site of the supposed fracture, the situation of the limb when the injury was received, and, lastly, the attending symptoms, etc." Fur-

ther on, he says: "Bones are more apt to be broken in those places where they are hard and brittle, as in the firmer parts of all the long bones, than toward their extremities, where there is more soft and yielding texture, and than bones that lie deep under cover and protection of muscular parts are exempt, as in the thighs." Again, speaking of the diagnosis of fractures, he says: "The grating noise on the parts being handled, and distortion and loss of power, to a certain extent, in the injured limb, will be found on a minute examination to accompany almost every accident of this kind." He further remarks that, "unless the divided parts be completely separated from each other, neither distortion nor crackling will be perceived on handling them; nor will the bone be rendered incapable of sustaining those parts of the body which usually rest on it. In such cases we judge of the probability of a fracture having happened from the violence of the injury, the severity of the symptoms, and other circumstances already enumerated."

Dr. Louis Stromeyer, in his Handbook of Surgery, February, 1844, says: "Generally the diagnosis of fractures is not difficult, but may become extremely so in cases where edema and muscular contractures have entered, or where complications exist. Very often it is not advisable to continue the examination too long. It suffices only to ascertain whether such injuries are present which demand immediate attention and then proceed for the time being as if a fracture actually existed. After the edema declines the diagnosis becomes easier. Caution regarding the diagnosis of a fracture should be recommended and emphasized, notably in those cases wherein the fragments are so wedged into each other that even the employment of a pulley is not able to separate them. Even without being necessarily wedged in, the fragments may happily accommodate themselves to each other so that the most important symptoms will be absent."

Taking the work of one of our own surgeons, Dr. Wm. Gibson (The Institutes and Practice of Surgery, dated 1827),

he says: "The signs of fracture are not always very decisive. In general, however, crepitation, or that particular noise or sensation produced by rubbing together the fragments of a broken bone, is more to be relied on than any other, and is an almost certain indication of fracture. Added to this there is usually more or less deformity, pain, swelling, and inability to use or move the limb. But these symptoms may attend luxation and other diseases,and are therefore not unequivocal proofs of fracture. Besides, it is possible for a patient actually to labor under fracture of one or more bones and yet, from interlocking of the fragments, or from a sound bone serving as a splint and supporting the broken one, no distortion will be perceived."

A few years before this, Dorsey's Elements,Vol. 1, p. 113, and Allan's Surgery, Vol. 2, p. 60, held the same position, their wording being about the same as Gibson's. We thus see how the authors of surgery of that period were drifting closer to the recognized theory and practice of to-day.

The following general method must be gone through with in diagnosing fractures: First, a complete history of the case and manner of receiving the injury, where this is at all attainable. Second, an examination of the normal landmarks and movements of the parts affected, not forgetting the position of the long axis of the bone. Third, a comparison with the opposite bone or side, as to position and general contour. Here we must resort to measurement, taking two extreme fixed points for the purpose. In impaction the measurement may be the means of making the diagnosis. Abnormal movement near the joint as well as in the shaft of bones is significant. General palpation with manipulation, and, simply as confirmatory of the diagnosis, crepitus.

The accessories to the diagnosis of fractures are many. There are a few that stand out prominently. Anesthesia is always necessary in fractures near joints, also in children who are frightened and complain of much pain. In fracture of the surgical neck of the humerus operative means may be

required simply as a means of diagnosing. The Rõentgen ray should be used in fractures of the extremities where overlapping bone does not intervene between the fractured parts. With the employment of anesthesia and the X-ray, fractures of the head of the radius and the condyles of the humerus are diagnosed. A few years ago all these fractures were designated by the term "fracture of the elbow joint." With modern methods we can not only confirm the diagnosis of epiphyseal separation of the head of the humerus, but we can, with antiseptic operative treatment, suture the fragments in place, and so get satisfactory results.

The old method of diagnosing fractures of the skull was by sight and manipulation. Nowhere can the progress in diagnosing fractures be shown to greater advantage than in trauma of the head. To-day in treating an injury of the head we wish to learn the history—how, when, and where the trauma was received; situation of pain, if it is acute; local signs, as condition of pupils, muscles of the face, or extremities; the reflexes; if respiration is interfered with; if cerebral disturbance is pronounced; hemorrhage from ear, nose, and mouth, and sub-conjunctival ecchymosis, or discharge of cerebro-spinal fluid from ear or nose, and lastly, is there any form of hemiplegia? Any two or more of these will make the diagnosis positive. In all cases of injury or supposed injury to the head we must not forget opium poisoning, sepsis, especially meningitis, apoplexy, uremia, and alcoholism in making our diagnosis. In the majority of cases of extra-dural hemorrhage, there being no complications of concussion or laceration of brain, unconsciousness takes place in from a few hours up to ten or twelve weeks. In concussion and laceration we may have semi-consciousness with the other classical symptoms, but in hemorrhage we get coma and unconsciousness. Compression may be due to hemorrhage only when that is considerable. The cranial bones must be considerably depressed before cerebral compression is manifested by the classical

symptoms. Where the compression is acute the pulse is slow and feeble and the patient is restless and delirious. In cases of late compression following muscular spasm and twitching comes paralysis and paresis, then drowsiness, stupor, and death. Here we have a rapid, small pulse, frequent and shallow respiration, with sighing, which passes into the Cheyne-Stokes type as death approaches. There may be a fissure fracture of some of the bones of the head with a complication of laceration of the brain. Here we have all the symptoms of severe concussion with immediate and continued unconsciousness. Following the shock there will be a temperature of 103° or higher, which makes the diagnosis of laceration positive and precludes concussion. In fracture of a cranial bone in the near neighborhood of the meningeal artery, or where a fissure of the fracture extends across the artery or any of its branches, immediate surgical interference should be resorted to.

The normal elbow has no lateral movement. Fractures of the internal or external condyle may produce a lateral movement—the former may involve the ulnar nerve by compression with small fragment. Fracture of the humerus into the elbow joint, fracture of the epicondyle, of the external or internal condyle, should be treated by the acutely flexed position, which gives little pain, with the least discomfort. Massage should be of the gentlest kind and begin at the end of the second week. We should remember that massage and passive motions, when painful, do harm in late fractures, especially those about the joints. In fracture of the olecranon, with the arm extended and a long splint reaching from the axilla to the fingers, the olecranon manipulated into position and held there by a strip of adhesive plaster above and over the upper small fragment and made fast to the splint some distance below, we have the recognized treatment. Upon the same principle can fracture of the patella be treated. In the open operations on these parts, suturing the fibrous tissue and the periosteum will give as good results as suturing the bone.

In fractures of the neck of the femur, measurements with Nelaton's line, Bryant's triangle, and the leg measurements will be sufficient to make a diagnosis, having had a definite history of the injury.

The reduction of a fracture and the application of a splint is but a small part of the required treatment. For example, fracture of the surgical neck of the femur in an old person requires the utmost tact and the widest surgical judgment. Within two or three weeks hypostatic pneumonia must be looked for, and when found, treated. Restlessness, kidney and skin complications must be kept away, and local (about the seat of fracture) inflammation be looked for and treated. Ulcers upon the back and upon the heel develop very rapidly. Injury to the hip in childhood may give no immediate bad symptoms, the trouble coming on later, but in old age the disability is severe and immediate.

Ambulatory splints, to be a success, must give protection to the parts as well as fixation and traction. The ambulatory treatment was first taken up in disease of the hip joint. The purpose was to get the patient outdoors. The leading surgeons now recognize the possibility of treating fracture with an ambulatory splint. Thomas has had some success with his splint, but it seems to lack power of fixation. Fowler, at the meeting of the American Surgical Society held at Detroit, showed an ambulatory splint. Thomas's splint seemed to be too light, Fowler's too cumbersome and heavy, but each was an advance along the right line. The pneumatic splint, made by the Ambulatory Pneumatic Splint Manufacturing Co., of Chicago, has given good results in my practice. This splint gives comfort, as extension and counter-extension may be provided from points remote from injury. The appliance is fitted to each case by the surgeon, and any interference with circulation may be noted and remedied. In compound fractures the dressings can be done antiseptically and quickly. The keeping up of the bodily strength with outdoor exercise is of the greatest value.

Complications may exist in fractures where the utmost surgical skill is required. Where spiculæ of bone should be removed in compound fractures or in gunshot wounds, is a nice point to decide. Suppose that, in the dastardly attempt on the life of our President, the bullet that passed partly through his body had splintered some portion of a vertebra, or suppose that the sternum had been fractured, or one of the ribs, which in turn had wounded the pericardium. Any of these conditions would have called for the best efforts of those master minds who had the President's life in their hands. In fractures of the thigh it is not uncommon to have the great vessel of the limb lacerated or involved, leading to traumatic gangrene of a very severe and rapidly destructive character, necessitating an amputation. From pressure against the skin in unreduced fracture sloughing may occur. When there is considerable stripping up of the periosteum, necrosis of the bone may take place. Fat embolism is a bugbear in fractures where there is considerable laceration of tissue, especially if the fracture be compound, following the injury on the first or second day. The treatment consists in immobilization of the fracture, heat stimulus, and oxygen, if there is threatened asphyxia.

There is no branch of surgery in which the fee for services rendered is so small as that for the treatment of fractures. Take a simple fracture—making the diagnosis, instituting proper treatment, noting the daily changes, and informing the patient when and how he may resume the normal functions of the parts involved—all this requires a surgical experience that should receive proportionate compensation. Take a fracture that is complicated with joint, vascular, or nerve lesion, and it calls for all the judgment, knowledge, and experience that the careful surgeon possesses. The requirements for accepting these cases are just as high as for any line of surgery. If a $1,000 fee for a nephrectomy is a fair one, the same amount for services in the case of a fracture of the surgical neck of the femur is but a fair recompense.

Where it is possible to charge and collect $5,000 for an operation, I think as much should be required from the patient in a case of complicated fracture. So I say let us have value received for our work in fracture cases as well as in all other lines.

DISCUSSION.

DR. C. H. HUGHES, of St. Louis, Mo.—Mr. President: The head symptoms in fractures have not received the consideration to which they are entitled from surgeons, for the reason that they are not habitually so much accustomed to thinking of head symptoms as symptoms connected with other parts of the body where surgical injuries have taken place. I recall one surgical case which made a profound impression upon me when I was doing a good deal of that kind of work. I went out one night with the coroner of St. Louis to see a woman who had been struck by her husband with a coffee or beer bucket or can behind and above the ear, producing coma and death a few minutes after the accident. The can was empty. A post-mortem examination was made and it was found that there was no fracture externally, but there was a fracture of the internal table, which readjusted itself after the rebound from the injury. The middle meningeal artery was ruptured by the blow, and the extravasation of blood produced the symptoms. I believe that if a surgeon had been on the ground promptly and had appreciated the true significance of the supervention of coma from a blow of that kind, he would have remedied the difficulty by ligating the middle meningeal artery, thus saving the woman's life pending the coma. I have not seen a similar case of this kind in the surgical records, and I place it on record, inasmuch as I am not accustomed now to attend surgical meetings as formerly.

The neurological symptoms in surgical injuries ought to be always sought for and duly considered. We had a significant illustration of the necessity of estimating logical symptoms in the case of the lamented President Garfield. You will recollect that Garfield was shot in 1881, and his case attracted particular attention at that time. His symptoms were in the toes,and pointed to the lumbar-dorsal area of the spinal cord, and yet probing was done in the pelvic cavity by the surgeons, while the dorso-lumbar spine was overlooked until the post-mortem examination was made, when the

bullet was found to have gone through the spinal column in front of the spinal canal and fractured the first lumbar vertebra and done a lot of other mischief on its way there and to its place of lodgment a little below the pancreas and to the left of the column, when it became harmlessly encysted after it had mortally injured one of the mesenteric arteries, whose subsequent rupture caused President Garfield's death, over eleven weeks thereafter.

DR. A. M. HAYDEN, of Evansville, Ind.—I believe the essayist referred to the early use of passive motion and contraction about joints, saying that passive motion should be resorted to about two weeks after the injury. The sooner we eliminate passive motion in fractures about joints the better it will be for our patients. I can not see where any advantage is to come or to be gained by moving a joint that has a fracture into it before it has completely healed. I think the joint should be kept absolutely quiet or immobilized for at least four or five weeks, so that the fragments may become thoroughly united and healed before any attempt is made to move it. For instance, let us suppose we have a fracture of the elbow joint. We replace the fragments as well as we can; we immobilize that joint and leave it there until it gets well. If we do not, or if we move the joint before we have complete union, we set up an irritation which produces an additional callus, which increases the deformity and interferes with motion of the joint afterward. It seems to me a great many surgeons and physicians throughout the country who treat fractures make a great mistake by using passive motion too early.

DR. WELLINGTON T. STEWART, of Chicago, Ill.—The essayist spoke of suturing the fragments in fractures. He did not dwell very much on that phase of the subject, and I rise more particularly to refer to it, because I have been disappointed in reading the literature or text-books as to the procedures or methods adopted in suturing the fragments of bone in fractures where there is delayed union. Some of the text-books recommend the use of ivory pegs, some wire, some platinum wire, and some catgut sutures for this purpose. They have all been disappointing in my hands, and probably this disappointment may be due to the operator. However, I have talked with eminent surgeons at different times, and I find that this has been their experience too. I would like to hear from some of the eminent gentlemen present as to what their experience has been in regard to immobilizing the parts in fractures with delayed union and in fractures of recent occurrence.

DR. S. S. THORN, of Toledo, Ohio.—In answer to the gentleman's question who has just spoken, we want to inquire into the cause of delayed union. I am inclined to believe, as the result of some observation, that one cause of delayed union is malnutrition. This malnutrition is the result of enforced anemia, and this anemia is the result of the too firm application of bandages and the use of short splints. The application of a short splint must necessarily bring about tight constriction, which induces anemia, hence starvation, with delayed union. In some cases of delayed union I have taken off all dressings and applied a bandage more tense beyond the seat of fracture, so that I might have a hyperemic condition and thereby improve the nutrition of the part. In this way I have secured a hyperemic condition as well as improved nutrition by suspending the limb, putting the patient on crutches, elevating the other foot, allowing him to walk without touching the ground. As a consequence, there has been gravitation of blood to those parts which have been bound; the walls of the vessels are always relaxed and fill up better, thereby increasing nutrition.

My success in suturing bones has probably been about the average, and my failures have been about even with my successes—just about six to one perhaps, and half a dozen to the other. Why I failed in one case I do not know, and I could not find out except by attributing it to the fact that in my early practice I was too careful in my application of bandages, applying too much constriction.

DR. WELLINGTON T. STEWART, of Chicago, Ill.—The reason I asked a question in my previous remarks was this, that last summer there was a railroad wreck at Cairo, Ill. Nine people in an opera troupe were killed, and only three were saved. One of them was a woman, who was kept in a hospital at Cairo for nine weeks. She sustained a compound comminuted fracture of the thigh, also a compound fracture of the tibia and fibula. The fracture of the thigh united by callus, with an exostosis and a great deal of deformity, while the fracture of the tibia and fibula did not unite. At the end of this time she was removed to a hospital in Chicago with which I am connected. She was put on the table after she had been there a week, and I cut down upon the fragments, freshened the ends of the bone, and used bronze aluminum wire with which to bring the ends together, and did an aseptic operation. The patient was put back to bed, and the limb elevated to increase the circulation. She was put on tonics and stimulants containing lime and phosphates, so as to build up her nutrition. She lay in bed for three months, and

the limb had to be operated on again. At the second operation it was found that union had not taken place to any extent, there simply being a little fibrous union, which was very pliable, and the reason I brought up the question was to determine if there was any new method or technique of uniting bones other than by wire, because it seems to me this is a very crude method.

DR. A. J. OCHSNER, of Chicago, Ill.—There are two causes for non-union of bone, one of which Dr. Thorn has mentioned. The other cause consists in the interposition of soft tissue, muscle, or fascia, or cicatricial tissue, after compound fractures, like the one Dr. Stewart has mentioned, between the fragments. The cases that Dr. Thorn has described will practically all get well provided a sufficient irritation is set up. The first case which impressed me with this fact was one in which several operations had been performed by very able men, about sixteen years ago. The patient had non-union after each one of the operations. The patient was then thrown out of a buggy and had his thigh bruised severely, and had a perfect union, so perfect that the femur on this side was quite as strong as it was on the other side. In two of the previous operations I had assisted the surgeon. Both operations were done during my interneship in the hospital. In this case there was the interposition of a portion of the vastus externus muscle between the ends of the bone, and they were tapering and soft.

In a second operation there was nothing interposed between the fragments except the cicatricial tissue which had formed during the healing, and the result was the same. I believe the third operation resulted in the same way. I assisted two surgeons in operating on this case, at two different times. Much to my surprise, two years later I saw the same patient with a perfectly united thigh as the result of his accident.

Since that time I have had an opportunity to observe a large number of ununited fractures, especially of the femur and tibia, and the first step in the treatment is always the one pointed out by Dr. Thorn, namely, to secure irritation. The ununited fracture is placed in the best possible position, the patient is then put on the ambulatory treatment by applying a cast or the ambulatory splint which the author of the paper has described, or any method by means of which he is able to walk, making him walk upon the end of the bone. The great difficulty in ununited fractures of the tibia and fibula is this, that almost every one who treats these fractures with splints or with plaster-of-Paris casts dresses the fracture

with the foot in the talipes equinus position. The patient in walking does not walk directly upon his tibia and fibula, but upon his toes, and every step he takes he walks with a spring. If the foot is placed at less than a right angle, every step the patient takes brings his weight down upon the tibia and fibula, and if there is no muscle interposed the tibia and fibula will invariably unite. The principle is this: Instead of coming down softly upon the bone, he comes down solidly and produces the irritation which we have had pointed out to us. The same is true in cases of fracture of the femur. If we get a sufficient amount of irritation they will unite. At the time of operation we should strive to bring about a sufficient amount of irritation. I have treated dozens of cases of ununited fractures, many of them having had to undergo several operations. The principle of the operation was simply to cause enough irritation at the time of operation, then to suture the fragments together with catgut and to apply the same form of treatment aside from this that would be employed in a simple fracture of the same portion of the bone.

DR. A. M. PHELPS, of New York, N. Y.—I was very much interested in this paper. I have charge of a large fracture service in the City Hospital, New York, where I am constantly encountering the complications which have been mentioned, and that is one reason why I am so much impressed with this subject. With reference to delayed union, there is a third reason why union does not take place in these cases. If a fracture takes place through that portion of the bone supplied by the nutrient artery, and the artery becomes ruptured, nutrition is cut off, and there is a third reason why these cases of fracture sometimes do not unite. To place these cases in coaptation splints and hold them for a prolonged period of time in any apparatus whatever, thus shutting off circulation, in my opinion is wrong treatment. Any ordinary case of fracture may result in non-union. We have abandoned the use of coaptation splints in all respects in our work, and we are now applying the old principles which were taught us more than fifty years ago, of extension and fixation. That is the only thing—I do not care how extension and fixation are applied. If you pull upon a limb that has been fractured you pull upon the muscles and you do not pull on the bones, and the moment you put the muscles on a stretch you make a splint of the muscles, so to speak, which will hold the bone in position. Coaptation splints are useless and harmful if improperly applied. In all cases of fracture of the femur we put the patients to bed and apply Buck's extension for a week or ten days, until the laceration of the

soft parts has subsided, after which we put on braces, get the patients out of bed and into carriages, and drive them around and feed them well.

In fractures of the neck of the femur, particularly in those people who have passed the age of forty, we cut directly down upon the great trochanter (the end of the joint), coaptate the fragments, etc. I presented some beautiful specimens during the month of May, illustrating this subject, at the meeting of the American Orthopedic Association, which you will find recorded in the Transactions of that body for this year. At that time I reported the only cases of perfect bony union in cases of fracture of the neck of the femur I ever saw.

In regard to non-union, when it does occur, operate as you like, and many of these cases you can not unite. It was for that reason that years ago these cases were operated on by various surgeons repeatedly and their work was followed by failure, that I resorted to bone grafting. It is a simple method. If you cut down upon a fracture, cut the ends of the bone off, do not put bone between the ends of bone, because it will act as a foreign body, interfere with nutrition, and it is wrong. Wire the bones together, lay on shingles, put splints of bone all around the bone, fill the tissue with little spicula, and you will start centers of bony ossification and you are likely to get union. I have succeeded in that way where I have failed by resorting to other methods. I have repeatedly, in cases of fracture, set up osteomyelitis; there has been sloughing of bone, and in many of the cases union has taken place. If you leave an open wound there is no danger of infection.

Passive motion should not be resorted to. Fixation of a joint that has been fractured into will ankylose, or a diseased joint will ankylose by prolonged rest—is a failure wherever it occurs. During the last fifteen years I recall many cases of joints that were held anywhere from a year and a half to two and five years, and yet in not a single case was there ankylosis of any hip joint excepting where there had been great destruction of the soft parts. Bringing bone in contact with bone under these circumstances we may get ankylosis.

With reference to the ambulatory treatment, you may apply extension and fixation with the patient in bed for a certain length of time in fractures of the long bones of the lower extremity, then put on properly applied braces devised either by yourself or by other surgeons if you desire. If the fracture is oblique and below the knee joint you can not

let the patient walk on it, for the reason that it will drive the bones one by the other. If you have a transverse fracture and treat the case so that the heel will come down, you may get good results even in a case of delayed union. In very many of these cases the limbs become distended from the effusion of serum. This interferes with the circulation. At the end of the third week, if you will begin with a rubber elastic bandage put on the limb and allowed to remain for five minutes, then take it off and reapply it, at the end of a few days you will get rid of the edema.

In regard to wiring in cases of compound fracture, we do not wire a fracture. That is not the idea. Where we are treating a fracture that has an infected wound, our object is to get rid of infection, and when you have cut down and have gotten rid of infection, it is an easy matter to wire the fragments with silver wire, which I have found the best. If there is any difficulty in keeping simple fractures in apposition, if you are going to get shortening, it is better to cut down on them and wire the fragments.

In fractures of the skull operation should be immediately performed, and symptoms of compression, which occur a week or ten days after operation, indicate pus nearly always. Such a case should be operated on. In all cases of fracture of the skull, if patients are in a hospital, if there are symptoms of compression or concussion, I operate. I believe trephining and elevating the depressed fragment or fragments is a simple procedure, unattended with mortality if properly performed, and I should not hesitate to operate in all cases of fracture of the skull where a distinct and accurate diagnosis is made.

Dr. Smith (closing the discussion).—I wrote this paper for two or three reasons, one of which was to bring out the prominence of this part of surgery. In the next place, it was my desire to bring out the fact that joints should not be immobilized for the length of time that we have been in the habit of immobilizing them, and that injuries to the head ought to be operated upon more frequently than they really are. This point was brought out very nicely by Dr. Hughes. The tenor of my paper was not to suture the bones in the hope of bringing about immobilization, but where there was an epiphyseal separation to cut down and suture the parts in apposition. For instance, if it was a case of fracture of the external condyle of the humerus, I would cut down from the parent bone and suture the condyle to the fibrous tissue and periosteum to the humerus, simply holding it in place, and then apply an acutely angular splint, leaving it on for several

days before redressing it. I disagree with the gentleman who spoke of leaving the joints untouched for a number of days. I think we should leave it up for a few days in children, then take it down, examine it, and reapply dressing; then we will know in what condition the fractured part is. Without doing this, even with the aid of pulse and temperature, we will not be able to tell the condition the fracture is in. I believe this, that we need not be afraid of taking off the dressing or splint and inspecting the fracture, no matter where it is located, excepting it be in the case of an old person with an impacted fracture of the surgical neck of the femur. Such cases need not have any kind of splints; it is better to apply sandbags and let them alone, only giving them some support to aid ankylosis. That phase of the subject was taken up very thoroughly by Dr. Phelps.

XXX. A PRELIMINARY REPORT ON STERILIZATION OF RUBBER GLOVES, ETC., BY FORMALDEHYDE GAS, AND ON THE USE OF MILD ANTISEPTICS INSIDE THE GLOVES.

By A. GOLDSPOHN, M. D.,
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In 1889 J. Geppert (Bonn)[1] first revealed a serious error in the methods of testing the potency of the chief chemical antiseptics, by submitting micro-organisms of various kinds, in pure cultures, to the action of the individual antiseptics experimentally. Germs practically always ride on or in something or are attached to some vehicle, and it is only in connection with this carrier that they can be conveyed and exposed to an antiseptic and afterward implanted upon a culture medium. In this transfer the germ carrier, whether it be some filament or smallest particle of solid or fluid substance, is liable and often very capable of absorbing and carrying over, along with the germs experimented with, enough of the antiseptic to prevent the growth of the germs

[1] Berliner Klin. Woch., 1889, Nos. 36 and 37.

in the culture medium when they are *not dead*. This is proven by the fact that germs from the same lot and under the same conditions do grow upon the same culture medium if the antiseptic has been neutralized or otherwise eliminated from the germ-carrier before it is implanted upon the medium for growth. Thus, in the case of bichloride of mercury, for instance, Geppert neutralized the $HgCl_2$ in the carrier or vehicle by immersing it in a sterilized solution of ammonium sulphide, which is not an antiseptic. And this has become the accepted reagent in such tests of $HgCl_2$ by practical bacteriologists who appreciate the principle involved. But of this principle many practical physicians and surgeons are still not informed, as is shown in a number of publications of detailed experiments, particularly with formaldehyde gas. A couple of instances to illustrate: At the Columbus (1899) meeting of the American Medical Association, before the section on State Medicine, W. K. Jaques,[1] of the Chicago Board of Health, made a supposed test of the effect of formaldehyde gas upon streptococci and diphtheria and typhoid bacilli by exposing these germs, together with their culture medium, to the action of the gas. That is a mistake, because the culture material or food for the germs absorbs the gas most readily, and its qualities as a food for the germs are much more quickly destroyed than the germs themselves are killed by the gas; and then "no growth" afterward is far from being a proof of an adequate germicidal effect of the gas. The same error occurs in experiments made by John E. Owens,[2] Chief Surgeon of the Illinois Central Railroad Company, and reported before the American Academy of Railway Surgeons, Omaha, in October, 1899. He likewise exposed the culture medium (blood serum) after it was vaccinated with pathogenic microbes, during five and one-half hours, to the action of formaldehyde gas from formalin evaporated from sheets suspended in a room. He came to the conclusion that two ounces of the 40 per cent. solution was

[1] Journal Amer. Med. Assn., Jan. 13, 1900.
[2] Journal American Medical Association, March 3, 1900.

enough, when evaporated, to effect at least a surface sterilization of everything in a room containing 500 cubic feet, while the standard accepted by at least several creditable investigators is four times that amount. These experiments of both these men, ending where they did, proved nothing at all. They might have been made to show something by grafting a platinum loop full of the exposed spoiled cultures upon new supplies of the medium that were not spoiled by any antiseptic, and then placing these in an incubator for about ten days. Dr. Owens also subjected three kinds of pathogenic germs dried respectively in a loopful of some vehicle upon clean slides to the same test, and received no growth after 36 hours' incubation. But that is too short a time to decide for a non-growth.

C. H. Richardson,[1] of the Boston General Hospital, early advocated the sterilization of rubber gloves in a simple tin box for two hours by formaldehyde gas generated by heating aldehyde pastiles with an alcohol lamp (Schering's apparatus). He mentions a number of germs that he says are killed by the same procedure, but he fails to state the important details in his bacteriologic methods or technique, as every one should do if he wants to convince others. His brief, general, and summary statements go for little in that respect.

Such inaccuracies and errors as I have cited on the one hand and on the other the fact that men whose work in this line we have no cause to question, like J. J. Kinyoun and E. K. Sprague,[2] of the U. S. Marine Hospital Service, and Abba and Rondelli,[3] in a disinfecting institution at Turin, Italy, have not found the germicidal action of formaldehyde gas *alone* at all so simple, uniform, and certain even for surface disinfection, while its deeper penetrating effect is admitted to be small; these facts induced me to accept nothing as proven in this matter and to test every formalin apparatus myself with germs of known virulence, in pure cultures and

[1] N. Y. Medical Journal, June 14, 1899.
[2] Report of U. S. Marine Hospital Service, 1897, Vol. 26, p. 722.
[3] Centralbl. f. Bacteriologie, etc., Bd. 28, Nos. 12 and 13.

supplied by competent bacteriologists, before relying upon the service of any standard or improvised apparatus.

As germ-carriers I chose little pieces of sterilized surgeon's silk, which would probably absorb and hold the least amount of the gaseous antiseptic. These were aseptically dipped into a watery menstruum containing the microbe desired, in pure culture. They were then wrapped in small pieces of sterile gauze and these parcels inserted each in a sterile test-tube having a sterile cotton stopper, half way to the bottom, and the cotton stopper replaced. Three or four tubes of each of the different kinds of germs were thus prepared and labeled with the name of the germ and three, four, five, and six hours, the time that each was intended to be exposed to the gas. The three-hour tubes of all the kinds of germs were then wrapped in sterile gauze and towels to make a package by themselves. The same was done with the four, five, and six hour tubes and each bundle marked plainly. When the formaldehyde chamber or box had become filled with the gas these bundles were put into it in such order as would permit their withdrawal speedily and in the order desired. When all these bundles had been smoked, they were usually exposed out of doors for a few days or in a place where the wind could strike them and blow out the gas from them so that it could not be detected by its odor. Then the different hour packages were opened and the threads in each tube were placed into a bouillon culture tube which bore a corresponding label and the date of the vaccination. All these culture tubes were then placed in an incubator and observed never less than ten days.

Experiment 1.—Dr. Herzog, pathologist of the Chicago Polyclinic and of the German Hospital, supplied me with virulent anthrax bacilli with spores. Sterilized pieces of braided silk were impregnated with these and mounted in 12 sterile tubes as described. These were placed in two packages and treated for one and two hours respectively in the formaldehyde sterilizer in the laboratory of B. K. Hollister & Company, Chicago, whose prepared ligature mate-

rials of all kinds have given good general satisfaction. The threads were afterward placed in bouillon cultures by Dr. Herzog and those smoked for one hour grew after 48 hours, while those treated for two hours grew after 72 hours in the brood oven. Dr. Herzog remarked, "It appears, therefore, that the exposure to formaldehyde vapors retarded the development of the spores, but did not kill them."

Experiment 2.—Fifteen sterile pieces of thread were impregnated with spore-bearing anthrax bacilli and placed in five packages, each having three threads amply wrapped in sterile gauze. One of these packages was marked "control" and kept in reserve and the other four were marked two, three, four, and five hours respectively, and treated with the gas in the Hollister apparatus for the periods of time indicated. They were then transferred in a sterile glass jar to the German Hospital Laboratory; and, after allowing two days for evaporation of the gas, the threads in each package, and also those in the control package, were placed into an equal number (three) of bouillon culture tubes which were correspondingly marked, together with the date of implantation. All were then incubated for 12 days at a temperature of 30 degrees centigrade. The three control tubes grew, but no growth occurred in any of the 12 tubes containing the formalized threads, the two-hour threads being also sterile, thus offsetting the non-success of the two-hour specimens in the preceding experiment.

Experiment 3.—Three sterile threads for each kind of germ were impregnated with streptococci, staphylococci, colon bacilli, and bacillus pyocyaneus aureus, all of known virulence, by Dr. Herzog, and delivered to me in sterile petri dishes, each kind by itself. I placed them, each one wrapped in a small piece of sterile gauze, into a sterile test-tube, dry, in about the center of the tube, not in contact with the cotton stopper, and labeled each tube. These tubes were then divided into three lots, each of which contained one of the four kinds of germs. These parcels were treated in Hollister's formaldehyde for one, two, and three hours respectively. These packages were conveyed aseptically to Dr. Herzog's laboratory and by him placed into 12 bouillon tubes. After five days of incubation 11 of the tubes developed nothing, while one marked "colon" and treated three hours showed a growth consisting of cocci (not bacilli). Dr. Herzog reported: "This growth, of course, is due to a contamination of the silk in handling it after it had been sterilized. The outcome of the experiment shows that all four types of micro-organisms worked with were killed by one hour's exposure to the formalin vapors."

The Hollister apparatus has a connection with a chimney flue at its top and the gas is generated by the lamp of his designing, placed under it.

Experiment 4.—Twelve test tubes, each containing two small pieces of braided silk wrapped in a small piece of gauze and held in the tube about one inch distant from the cotton stoppers, were sterilized upside down in a Boeckman steam sterilizer and dried in the same. The pieces of thread were then impregnated in sterile dishes with spore-growing anthrax bacilli of known high resistance or virulence, from the laboratory of Prof. Zeit, of the Post-Graduate Medical School, and were then returned to their respective tubes. Six of these tubes were then treated with the gas in a simple apparatus in my private laboratory, all for three and a half hours. After three days allowed for evaporation of the gas, the threads in them were placed into bouillon tubes, in which they remained sterile for over two weeks. The other threads in the remaining six tubes were treated in three lots of two tubes each for one, two, and three hours respectively, in a simple contrivance of Dr. J. Frank, consisting of the bake-oven of a gas or gasoline stove, *without a chimney connection*, but with a door on one side, shelves inside, and about a one-inch opening on one side near the top. Into this was fitted one end of a tin tube of equal size and about fifteen inches long, which was fitted at its other end to the top of the formaldehyde lamp (not Hollister's) and conducted the gas into the box. All the threads herein treated showed growth of the anthrax bacilli in the bouillon cultures subsequently in three days, with no difference between the one- and three-hour tubes.

Experiment 5.—Thirty-five tubes holding threads in gauze in each and stoppered with cotton as in the last experiment were also sterilized by steam, but by mistake not inverted during that process, so that their contents and stoppers were not dry afterward. The threads of five of these tubes were impregnated, one each, with staphylococci, bacilli of anthrax, pyocyaneus, colon, and subtilis, and set aside as "controls." The remaining tubes were divided into two lots of 15 each, and their threads impregnated exactly alike as follows:

Each of the five kinds of organisms here dealt with was placed upon the threads of three tubes, which were labeled one, two, and three hours respectively, with the name of the microbe. The five one-hour tubes (one of each kind), the five two-hour, and the five three-hour tubes were gathered into three packages, well wrapped in gauze, and marked one,

two, and three hours, and treated accordingly; the three of one lot in my private apparatus and the three of the other lot in that of Dr. Frank. After respectively nine and six days' incubation the result was as follows in the bouillon culture tubes: All the "colon" tubes and the three-hour pyocyaneus tube in the "G" lot remained sterile, while the one-hour and two-hour pyocyaneus tubes and all the staphylococci, anthrax, and subtilis tubes showed growth. The fifteen tubes in the "F" lot all grew and showed no difference between the kinds of germs or between the one and three hours of exposure. The five control tubes all grew. It was at once apparent that the poor result of this experiment was due to the very moist and too firmly packed cotton stoppers in the thirty tubes holding the threads to be acted upon by the gas. Therefore this entire experiment was repeated as described, but with care to obtain the tubes and their stoppers dry by having them inverted in the steam sterilizer. The result was then far different. After ten days' incubation all the fifteen tubes in the "G" lot showed "no growth," excepting the "one-hour" anthrax and subtilis tubes, which developed a growth after six days. But in the "F" apparatus each of the fifteen tubes showed growth, as did also the five "controls."

Inasmuch as the "F" apparatus showed no positive germicidal effect at all in these tests, it was no longer worked with. But six more of these culture tests, each with fifteen tubes and five varieties of germs, each in pure culture and of known virulence, were made with my private apparatus. All of these experiments showed likewise that a three-hour exposure to the gas invariably killed virulent spore-bearing anthrax and also the bacillus subtilis—the severest or most resistant test-objects usually employed—while a two-hour exposure usually killed all the pus microbes and others that are more generally encountered in medical or surgical practice.

My apparatus consists simply of a tin bread-box, 11x12x15 inches in size, well coated inside with white enamel paint and placed endwise on a four-footed frame upon a table. The Hollister lamp was placed under it, with its chimney projecting into it a short distance through a hole of just sufficient size cut in the bottom. At the top this chamber is connected with a chimney flue of the building by means of a very small and controllable aperture and a speaking-tube

connection. The object in this arrangement was to facilitate the desirable displacement of the air in the chamber by warming it by the lamp underneath and permitting it to escape at the top. Then the formaldehyde gas would be less or not so long mixed or diluted by air, and would be correspondingly more effective. Furthermore, a slight current would subsequently be favored in the gas filling the chamber, which would also add to its efficiency in a similar manner as in steam, of which we know that, in the absence of a previous vaccuum succeeded by steam alone and under pressure, it is not steam crowded with air into a closed receptacle, but a current of steam ("Stroemender Dampf"), that kills in steam sterilizers. The sterility of the inner surfaces of three pairs of rubber gloves that had been treated in the apparatus described for three hours was tested by pouring a culture medium (bouillon) into each glove and then into petri dishes. No growth resulted in any of these.

But we need more than sterility of the inner and outer surfaces of these gloves. Their impermeability can not be trusted in so serious a matter as surgical asepsis, because needle punctures and similar injuries of any new glove are too easily made and of frequent occurrence. Therefore the skin of the hands with its appendages and its excretions must be looked out for quite as much with as without the use of any kind of gloves. And inasmuch as many previously inaccessible germs in the deeper strata and crypts of the skin come to the surface and accumulate with the sweat (which without such gloves would mostly have evaporated), it appears to me to be extremely desirable to make this perspiration innocuous by using mild antiseptics inside of the gloves. For this purpose I use boric acid powder (sterilized in the same apparatus), in place of the inert and insoluble talcum powder, in the gloves to preserve the rubber and to facilitate their application, which is very much easier than when they are filled with water. After they are applied each glove is held open, in succession, by the fingers of the

other hand, so as to enable some assistant to pour about half an ounce of 50 to 55 per cent. alcohol into the palm of each hand, from whence it is milked into every finger of the gloves, and after five to ten minutes the gross excess of this fluid and of boric acid dissolved in it is made to escape at the gauntlet if there is any likelihood of its dripping into the wound.

The germicidal action of alcohol so diluted was ascertained and pretty well proven by the very creditable investigations of Epstein,[1] Ahlfeld,[2] Reinke,[3] Schaeffer,[4] Petrusky[5] and W. v. Brunner.[6] According to these investigations such a large proportion of water must be combined with the alcohol because of its superior softening and penetrating effect upon the germ envelopes, which are seemingly hardened but not readily penetrated by alcohol alone. Ahlfeld holds that germs are readily or safely killed by alcohol only or chiefly if they are water-soaked, so that a diffusion of currents ensues by the abstraction of the water from them by the alcohol.

To determine the practical merits of this entire procedure and to ascertain how much danger there might be from the little perforations in the glove fingers that they very soon get, I made several series of culture tests of the "glove fluid" —mostly sweat—that had accumulated inside of the gloves during several hours of operating, when certainly only very small traces if any alcohol remained; because usually variable quantities of this fluid had already been repeatedly milked out of the gauntlets during the work. Thus in one series the fluid from both gloves was received in a bouillon tube in eight instances in which the hands had been scrubbed at least fifteen minutes in hot water and soft soap, then treated with alcohol and with 1-2000 $HgCl_2$ in succession and then the gloves were applied dry, powdered with steril-

[1] Zeits'sft f. Hygien. u. Infect. Krankheiten Bd. 24. 1897.
[2] Monats'ft f. Geb. u. Gyn. 1893, No. 3, also Deutsch. Med. Woch'sft, 1895, No. 51, and 1896, No. 6.
[3] Centralblat f. Gyn. 1894, No. 47, and Archiv. f. Gyn. Bd. 49.
[4] Therapeut. Monatshefte, July, 1895.
[5] Zeitschrift f. Hygien. u. Infect. Krankheiten Bd. 17.
[6] Centralblat f. Bacteriologie, u. s w. Bd. 28, No. 10 and No. 11, S. 309, 1900, and Salzwedel u. Elsner (Berlin. Klin. Woch'sft, 1900, No. 23).

ized boric acid, and finally the dilute alcohol was poured in. In another series of eight pairs of gloves in which the hands had been treated in the same manner, but with the $HgCl_2$ omitted, the fluid was tested in the same manner. In a third series of four instances the fluid in the gloves of one and the same assistant was tested, who had scrubbed his hands, then used alcohol and $HgCl_2$ and the boric powder dry without the alcohol in the gloves. In none of these twenty tests did any growth of any kind ensue during an observation of never less than ten days, aside from an occasional growth of fungi owing to accidental contaminations.

Then three pairs of used gloves were tested by pouring the culture into them immediately after taking them off and planting it. Here one colony was obtained in the culture from the gloves of a nurse assistant. Then, thinking that the boric acid might possibly vitiate our results by inhibiting the growth of germs, we discarded it in the next series of seventeen tests, and used the customary inert talcum powder sterilized, in its place. In all these instances the hands had been cleaned by scrubbing, alcohol, and $HgCl_2$ solution in succession. In fourteen of these instances the dilute alcohol was used in the gloves with the talcum powder, and in three it was omitted. But the results with this inert powder were as negative as with the boric acid, there never being growths aside from accidental fungi in a few cases. Therefore the almost uniform non-growth from the culture tests of the "glove fluid" where boric acid had been used was not due to any inhibition from remnants of boric acid in that fluid. And if the boric acid had disappeared, it is quite certain that the dilute alcohol in which it was dissolved in the beginning had also practically disappeared from the fluid that was finally tested; and therefore it need not be feared that the non-growth of the culture tests of that fluid was due to any retardation of their growth by the alcohol used at the outset.

But during the past six months I have discarded all lamps for the generation of this gas, because they are too extremely

uncertain and unreliable in their action to be depended upon, for many reasons, and they practically are out of use except by a few who understand them well and are interested in their sale. The generation of formaldehyde gas by evaporating formalin (the 40 per cent. solution in water) is more simple, uniform, and effective. To prevent polymerization, I have added an equal amount of 4 per cent. boric acid solution to the formalin, after the suggestion of P. A. Dubois (*Pacific Med. Jour.*, January, 1891). This I use as follows: A sheet-iron pan of sufficient size, containing dry sand, is placed approximately over the opening in the bottom of the sterilizer two and one half inches in diameter, through which formerly the chimney of the lamp projected. This sandbath is heated by a small or gentle gas flame from an incubator lamp that is placed beneath it in such a manner that the flame strikes toward or against the exposed part of its bottom. Upon this sandbath the diluted formalin is evaporated in a shallow basin having a bottom area of about 25 square inches. In my sterilizer above mentioned, which has a cubic contents of almost exactly one and one seventh cubic feet, one and one half ounces of the diluted fluid (four drams of formalin) are required to kill the more resistant spore-bearing anthrax bacilli when the gas flame is so adjusted to effect complete evaporation of the one and one half ounces of liquid during three hours, as proven by numerous additional culture tests. During this procedure the apparatus becomes quite warm (not hot) and the larger proportion of warm watery vapor generated by this diluted liquid assists the germicidal effect of the gas on general principles.

For sterilization in this apparatus, and to secure the far greater facility of their dry application, about one dram of the formalinized powdered boric acid is dusted about in each glove. Then a strip of gauze about 18 inches long is tucked into its fingers and its end is made to project from the gauntlet of the glove to facilitate the entrance of the gas. The pair

of gloves so prepared are then wrapped in gauze or light muslin in such a manner that their surfaces everywhere have cloth between them. This package is then wrapped again with a good towel, upon the outer surface of which the user's name, etc., is written with a pencil.

When they are to be used, an assistant opens the outer covering, the user the inner one; and after shaking out the superabundance of the powder from inside the gloves and rubbing it over his hands he draws them on dry with the greatest ease. He then holds the gauntlet open so that about one half ounce of the diluted alcohol (four parts of sterile water and five parts of alcohol) can be poured into the palm of the hand and from there forced into each finger.

XXXI. INFECTION FROM THE BACILLUS ÆROGENES CAPSULATUS: REPORT OF A CASE.

By JULIUS H. JACOBSON, M. D.,
Toledo, O.

In August, 1892, Welch and Nuttall first published, in the *Johns Hopkins Bulletin*, their discovery of the "gas bacillus," which they found after death in bodies with gas accumulation in the tissues. From its morphological character they named this bacillus the "bacillus ærogenes capsulatus."

Since the publication of this article much light has been thrown on the gaseous phlegmons, emphysematous gangrene, malignant edema, and air embolisms of the older writers; also on the so-called *Shaumorgane*, a term given by the Germans to the frothy condition of organs on post-mortem examination. It has been shown that all of these conditions are nearly always infections from the bacillus ærogenes capsulatus.

Even after the discovery of the bacillus, it was a matter of extreme difficulty to determine whether the infection was

of an antemortem or post-mortem type, and much credit is due Frankel, Welch, Flexner, and Dunham, whose subsequent researches proved that antemortem infection from this bacillus does take place. Since then a number of cases of antemortem infection have been reported.

It is a curious fact that Frankel, in 1893, published an account of a bacillus which he found in a case of gastritis emphysematosa which undoubtedly was identical with the bacillus ærogenes capsulatus of Welch. In a subsequent report of investigations on gaseous phlegmons, Frankel described a bacillus which he discovered in these conditions, to which he gave the name of "bacillus phlegmons emphysematosa," which corresponds morphologically with the bacillus ærogenes capsulatus, and which since has been proven to be identical with the same.

The rapidity and severity of infection from this bacillus, its great fatality, makes it interesting alike to the surgeon as well as to the bacteriologist; for in combating it, early and complete removal of the infected tissue, when practicable, has been the most successful treatment.

The bacillus was originally described by Welch and Nuttall as being a large bacillus, usually straight; but sometimes slightly curved or bent forms are seen. The ends are slightly rounded; they may appear, especially with adjacent ends, in pairs or short chains, square cut or nearly so, but this latter appearance is not so characteristic as it is with the anthrax bacillus. One of its most important morphological features is a distinct capsule. It is non-motile, and does not form spores; is from three to six micromillimeters in length and about one third as broad as long. It is strictly anaerobic. It stains well with aniline dyes, including Gram's method. The capsules may be seen when ordinarily stained, but are best brought out by glacial acetic acid and gentian violet, as described by Dr. Welch. It grows best at a temperature of 35° to 37° centigrade, but grows slowly at ordinary room temperature. Capsules can be demonstrated in bacilli ob-

tained from the body and in animal cultures. In agar tubes it appears at the end of twenty-four hours as a pale, whitish, moist growth, accompanied by gas bubbles. It is capable of growth upon all ordinary culture media, and produces gas wherever it grows.

When injected subcutaneously it is pathogenic for mice, rabbits, and pigeons, the animal dying in from twenty-four to forty-eight hours.

The gas has a disagreeable odor and ignites with a soft explosive sound and burns with a light blue flame.

Subsequently it was shown that these bacilli develop spores when cultivated on blood serum.

In the cultures taken from the case which I have to report, spores were demonstrated in stained specimens taken directly from the site of infection and in the ordinary culture medias, a fact which prior to that time had not been observed by others. Later, Welch, in his Schattuck lecture, stated that certain specimens of the bacillus would develop spores on ordinary culture media.

Investigations show that the intestinal canal and the soil are the two principal habitats of this bacteria. It is constantly present in the intestinal tract, where, after death, it may produce gas, perhaps in enormous quantities; or it may even during life, should the vitality of the intestinal tract become impaired, produce an infection with subsequent formation of gas in the tissues. Its presence in the soil makes it of vital importance in traumatic surgery, and it is this form of the infection which possesses the greatest practical interest.

In the majority of cases thus far reported, infection has taken place after an injury. I am inclined to the belief that the danger of infection of wounds from this bacillus is as great as that from tetanus.

Brooks found that in 427 autopsies, six infections from this germ had been responsible for the deaths. He also found it in the intestinal tract, in the nose, and in the vagina

of both living and dead subjects, and calls attention to the danger of this infection in injuries of the pelvic structures.

Infection from this germ may be a pure one, but is often found to be mixed; associated with the colon bacillus or with staphylococci and streptococci.

It is in cases of the so-called emphysematous gangrene that this bacillus plays its all-important role. This condition of gangrene accompanied by emphysema was recognized by the older writers, who ascribed the presence of gas in the tissues either to the entrance of air into them or to its formation from local decomposition of the tissue.

Since the discovery of the bacillus ærogenes capsulatus subsequent researches have demonstrated that emphysematous gangrene is always an infection from this bacillus.

Although this bacillus may gain entrance through any wound and cause infection, yet in the greater number of cases reported infection has taken place in compound fractures and gunshot wounds, this in all probability being due to the entrance of dirt and foreign substances into such wounds.

The period of incubation I believe has not been definitely determined. In reviewing a number of cases I find it, as a rule, from about one to five days. The shortest period was twenty-four hours and the longest seven days.

The infection is characterized by a rapidly spreading gangrene, accumulation of gas in the tissues, with tension, extensive local necrosis, especially of the muscles, elevation of the pulse and temperature, and an icteroid condition of the skin; and unless the infection be influenced by surgical intervention, death rapidly takes place from toxemia. That this germ produces toxins has not yet been definitely determined, but from comparing its clinical course with infections from other toxin-producing bacteria, it is inferred that such is the case.

After death there is a rapid formation of gas in the tissues, which is characteristic of the infection, and an extension of

emphysema to all parts of the body. Cultures taken from the heart, liver, spleen, and other organs will show the bacilli.

A number of cases reported have been infections through the intestinal tract, such as infection occurring after perforation from a gastric ulcer. Welch and Flexner report a case of pneumo-peritonitis occurring without perforation of the intestine.

Infection from the urinary tract, following external urethrotomy, and other urinary operations, have also been reported; and of the infections taking place through the uterus, Welch enumerates emphysema of the fetus, physometra, emphysema of the uterine wall, and puerperal gas sepsis, all due to infection from this germ.

In 1896 Welch and Flexner published an article in which they reported twenty-three cases of this infection. Of these cases, ten were surgical and thirteen medical. In the medical cases the bacillus was demonstrated on post-mortem.

These were cases of typhoid fever, nephritis, cirrhosis of liver, and valvular lesion of heart. After death the bodies became rapidly emphysematous, developing great quantities of gas in the tissues. Bacteriological examination showed the bacilli in every case. Of the ten surgical cases reported in this article, the bacillus was found both on ante- and post-mortem examinations. Of those cases four recovered and six died. In all of the four cases of recovery an amputation had previously been performed. One of these cases is so nearly like the one which I have to report that I outline it here briefly. The case was one reported by Dr. Mann.

When first seen by the doctor the hand, forearm, and arm were much swollen, with red lines extending upward from the elbow; the hand was gangrenous, green with blebs containing bloody, offensive fluid. Emphysematous crackling could be felt over the whole extremity as far as the deltoid muscle. The general condition of the patient was bad. The arm was amputated at the insertion of the deltoid. Gas bubbles were present throughout the tissues and exudate.

The patient's general condition improved the day after amputation, and the emphysematous crackling disappeared above the line of amputation. The case is reported as having been cured, in spite of the fact that four days after the operation symptoms of tetanus appeared and death is supposed to have occurred from that disease, and not from the infection.

Dr. F. K. Dunham reported six cases in which the bacillus was found on both ante- and post-mortem examinations. All of his cases died. Of his cases four were infections after fractures, in which the operative treatment consisted only of incisions and drainage. The two other cases were infections from the genito-urinary tract.

In some of these cases the infection was a mixed one, other bacteria being found with the gas bacillus, such as the staphylococcus and streptococcus varieties, also the bacillus coli communis.

In September, 1897, Dr. Dobbins described a case of a woman who had been in labor forty-eight hours before entering the hospital. There was a generally contracted pelvis, with a large child and impacted head. A frothy, bloody fluid escaped from the vagina, and in this fluid the gas bacillus was detected in great numbers. They were also found in the fetus and placenta. Shortly after death the body became rapidly emphysematous. No autopsy was made.

Dr. Erdman, of New York.reported an interesting case in the *Medical News* of 1897. The infection in this case occurred in a compound fracture of the humerus, followed by gangrene and death.

Dr. W. J. Love, in *Medical Record*, April, 1899, reports an interesting case of gunshot wound of the leg, with infection by this bacillus, on which amputation was performed followed by recovery. Dr. Love in his article deduces the following: Infection with the bacillus ærogenes capsulatus produces a rapid toxemia, with a rapid breaking down of the infected tissues and accumulation of gas in the same, rapidly spreading gangrene and death, unless very prompt and thorough means are used for the removal of the entire infected area. Amputation when practicable is always indicated; when not, free incisions and the removal of all necrotic material, free and continuous irrigation and drainage.

As the outlook in infection from the bacillus ærogenes capsulatus is extremely grave, the earlier the condition is recognized and radical treatment instigated the better is

the chance for recovery. Oftentimes simple stained specimens taken directly from the site of infection and examined with the microscope will reveal the bacillus. The diagnosis is made positive by culture and animal inoculation experiments.

The treatment consists of amputation when practicable, especially so when gangrene is present; when this can not be done, incision and free drainage.

Amputation seems thus far to have given the best results. In sixteen reported cases in which amputation was performed eight times, and incision and drainage eight times, six of the amputations recovered and two died, while in the cases of incision and drainage, two recovered and six died.

Welch says, of the cases of emphysematous gangrene affecting primarily the extremities, 68 per cent. recovered after amputation, and 33⅓ per cent. recovered after incision without amputation.

Halstead recommends that since this bacillus does not live in the presence of oxygen, it being strictly anaerobic, advantage should be taken of this fact and early free incision and drainage made.

Bloodgood summarizes the treatment as follows: If the infection is recognized early, and the destruction of the soft parts and bone is not extensive, free incisions with immediate continuous bath treatment should be tried.

If the general symptoms of infection are not immediately relieved, amputation should be done. If, however, the infection is recognized late, one should take no risk, but amputate at once. An early diagnosis will probably save life, and from many observations an amputation may not be necessary.

The case which I have to report is one which came under my observation at the Lucas County Hospital. The patient's history, as furnished by the attending physician, was as follows: Male, aged 48, carpenter. On May 1, 1900, patient fell a distance of about fourteen feet, sustaining a

compound comminuted fracture of the right arm. The injury consisted of a fracture of the lower end of the radius with a dislocation of ulna, and a fracture of the external condyle of humerus. At the wrist, over the seat of fracture, the soft parts were lacerated, extending the whole width of the wrist, allowing the styloid process to protrude through the skin. No laceration at the elbow joint. Patient was put under anesthetic, injuries were dressed by the attending physician. The following day the arm was dressed again. The third day after the injury the arm was examined, found to be doing nicely, and was not dressed. The fourth day after injury the whole forearm was found gangrenous and horribly offensive; the arm above the elbow, extending to the shoulder and side of chest, was swollen, edematous, and discolored. Patient up to this period had had but little fever. The day following the injury he became markedly jaundiced, the discoloration extending over entire body and involving the conjunctiva. Patient was removed to the County Hospital for operation.

His condition on admission to the hospital was as follows:

Patient somewhat emaciated, prostration very great; presented a jaundiced appearance, which extended over whole body. Pulse 106, temperature 101°. His right forearm was gangrenous from the tips of the fingers to the elbow joint, of a dirty greenish black color, and from elbow upward the arm, shoulder, and right side of body were very red and swollen; the arm and forearm were covered with large blebs filled with bloody serum. Palpation over swollen areas elicited emphysematous crackling, indicating air in the tissues. This crackling was felt over arm, shoulder, and right side of chest. The odor from the arm was horribly offensive and could be noticed a great distance from the patient.

The patient was anesthetized and arm first incised on its outer side from the shoulder to the elbow; tension in the arm was great, and large quantities of gas bubbles with bloody serum escaped through the incision, there being but little blood and no pus. The muscles were swollen, semi-necrotic, and filled with gas bubbles, which escaped on pressure. The wound was irrigated and a second incision into the forearm made, from the elbow down about six inches. The forearm was found to be absolutely gangrenous, possessing no vitality whatsoever. No radial pulsation could be felt, vitality, however, still remaining in the arm above the elbow; the arm was amputated in its upper third, near the shoulder

joint, with the hope of benefiting the patient by removing as much as possible of the disease and obtaining thorough drainage. The wound was thoroughly irrigated, flaps were left open, being held in place by a few sutures, and drainage secured with gauze.

The following day the wound was dressed; the flaps were found gangrenous, with the discoloration and crepitation of skin extending down the right side of chest and abdomen to the region about the hip.

Bacteriological slides and cultures were made directly from the wound by Dr. M. H. Bowman, at time of this dressing. The swelling increased until it involved the whole right side of patient, death taking place the following morning at four o'clock. After death the swelling continued and in a few hours had almost doubled itself in size, due to the rapid formation of gas in the tissues.

The bacteriological examination showed that the condition was an infection from the bacillus ærogenes capsulatus, discovered by Welch.

Dissection of the amputated arm, made twenty-four hours after amputation, showed gas in the muscles above the elbow, which exuded on pressure; no gas in the forearm, which was necrotic and gangrenous. The brachial, ulnar, and radial arteries were dissected free and examined for thrombosis, which was not found. A transverse fracture of radius, one inch from joint, with a longitudinal split extending into the joint, and dislocation of ulna, were found at the wrist, with a fracture of external condyle of humerus at the elbow.

Dr. M. H. Bowman's bacteriological report and résumé of experiments which we conducted on rabbits with the bacteria obtained from the case are as follows:

Bacteriological Report.—Cultures taken from stump of arm, May 5, 1900:

Tubes of gelatin, agar-agar, bouillon, and potato were inoculated, anaerobically sealed, and placed in thermostat at 35° centigrade. In twenty-four hours there was decided growth in the potato, gelatin, and agar-agar cultures, none in the bouillon culture, however. This was probably a fault in the technique, as I afteward produced a growth in bouillon, but with a small amount of gas production.

In the other tubes there was a very decided production of gas. Bubbles of gas were constantly rising in the tubes, and nearly one half an inch of gas bubbles formed at the top of the media. This gas had a very decided odor. In the incubator room it was very disagreeable. There was abso-

lutely no growth from this micro-organism in the presence of oxygen on any culture media.

Examination of the culture microscopically showed a bacillus from three to six micromillimeters in length and two to three micromillimeters in breadth.

Staining the bacillus by Welch's method with glacial acetic acid and aniline gentian violet showed that it possessed a capsule. These I have stained in large numbers, and they invariably have a capsule.

From the culture I isolated the staphylococcus pyogenes albus, showing that the original infection was a mixed one, or that the stump may possibly have become infected after the amputation. This is possible, though it is more probable that the original infection was from this bacillus, along with the staphylococcus pyogenes albus. Since the staphylococcus pyogenes albus possesses not very great pathogenic properties, its role must have been a minor one, yet it should be borne in mind that the virulence of a micro-organism may become very much increased when combined with others, whether pathogenic or non-pathogenic.

Three rabbits were made use of for experimental purposes.

Rabbit No. 1. I attempted to inoculate in the vein of the ear, but owing to a defect in the point of the needle I failed to enter the vein. This rabbit was killed within half an hour.

Eighteen hours afterward autopsy was held. There was no discoloration of the skin and no crepitation or production of gas. I did not examine internal organs, as I was sure there were no pathological changes.

Rabbit No. 2 was inoculated subcutaneously in right hip with 3 c.c. of the culture media, and twenty-four hours later was inoculated with 2½ c.c. in vein of ear. It was found dead twelve hours afterward. Can not say what time death occurred or how long it lived after the intravenous inoculation. On examination rigor mortis was absent. There was considerable edema over the body, which readily crepitated under slight pressure. The skin over the entire body was discolored—bluish in appearance. This discoloration did not have the appearance of a bruise, but a uniform blue tint without very deep discoloration. Incision through the skin and subcutaneous fascia permitted the escape of a foul-smelling gas, which, on applying a lighted match, burned with a bluish flame and produced a slight explosive sound. No discoloration of subcutaneous tissues, but the areola tissue was filled with an infinite number of small gas bubbles.

The stomach was greatly distended with gas, as well as the intestines.

The liver was dark, necrotic, very friable, and somewhat enlarged. The spleen was necrotic and broken down. The capsules of the kidneys contained large bubbles of gas, which separated the upper surface of the capsules from the kidneys. The heart was very dark, and did not possess the elasticity of the normal heart. The pericardium contained clotted broken-down blood tissue. There was complete atelectasis of the lower lobe of the right lung. Cultures were taken from the heart, lungs, liver, kidneys, spleen, and subcutaneous tissues, and within twenty-four hours there was an abundant supply of new cultures.

From one of these last cultures I inoculated rabbit No. 3 with 3 c.c. subcutaneously; fourteen hours afterward rabbit was dead, but I am unable to say just how long the rabbit lived after inoculation. On returning to the laboratory I found rabbit enormously distended with gas. No rigor mortis. Ears and entire skin of dark blue discoloration. Frothy, bloody discharge from nares. Subcutaneous incision and igniting the gas with a match gave a blue flame and quite a loud explosive report. There was no bloody discoloration of subcutaneous tissue. Liver dark, necrotic, and very friable, spleen broken down, stomach was distended with gas until it was as large as a pint measure. Large bubbles of gas were found throughout the mesentery; the kidneys were completely separated from their capsules by the distending gas. Complete atelectasis of right lung and lower lobe of left lung. Heart necrotic and friable. The entire intestinal tract was enormously distended with gas.

I account for the difference in the effects upon rabbit No. 2 and No. 3 by the fact that the cultures from this bacillus soon lose their pathogenesis. My culture was one week old when rabbit No. 2 was inoculated, while rabbit No. 3 was inoculated with cultures only twenty-four hours old. The passing of the bacillus through animals will restore the attenuated pathogenic properties. In passing of the bacillus through rabbit No. 2 its virulence was restored, as was shown upon rabbit No. 3. Some observers claim this bacillus to be non-pathogenic to rabbits and guinea-pigs. Welch and Nuttall found it to be usually pathogenic to rabbits, especially if their vitality was in any way lowered. Guinea-pigs and pigeons usually succumbed in from twelve to twenty-one hours, according to Welch. In both instances it was decidedly pathogenic in my experiments. When rabbit No. 2 died I attributed his death to flocculent masses of bouillon

carried from right heart to the lung and producing emboli. But when rabbit No. 3 died in so short a time from subcutaneous inoculation I concluded otherwise.

This bacillus corresponds in most every respect with that described by Welch and Nuttall. It is a short, round-ended bacillus, three to six micromillimeters in length, singly or in pairs of twos. When two are joined, very often an angle is formed. In artificial culture it is somewhat larger than when grown in animal tissues; a prolific gas produces non-motile, capsulated bacillus when stained with suitable dyes, does not liquefy gelatin or agar-agar, but disintegrates them by expansive force of gas production, acidifies the culture in which it is grown, giving decided acid reaction, exceedingly variable in its length, in thickness unusually the size of anthrax, strictly anaerobic.

In one respect we found a difference not noted by other observers. Dunham, of New York, states that spores are found when raised on Loeffler's blood-serum mixture, and that these spores are found in center, giving the bacillus the characteristic clostridium appearance. We found spores in specimens taken directly from rabbit and in the ordinary culture media. We believe no other observer has noted this spore formation. Welch and Nuttall originally claimed it had no spores.

Instead of the spores being found in the center of the bacillus, they were found at the end, giving them the shape of the tetanus bacillus and also symptomatic anthrax and malignant edema. These I can readily eliminate in the differential diagnosis. 1. Tetanus never leaves the point of inoculation; this bacillus was found throughout the system. 2. Tetanus does not possess a capsule; this germ does. 3. Symptomatic anthrax and malignant edema do not have capsules and do not take Gram's stains. This bacillus both takes Gram's method of staining and produces a decided capsule. 4. Tetanus symptomatic anthrax and malignant edema are all gas producers—all anaerobic. So is this bacillus both anaerobic and a decided gas producer. 5. They are all non-motile save symptomatic anthrax, and a majority of observers claim it is non-motile. 6. Symptomatic anthrax produces a pocket of bloody fluid at point of inoculation or infection. Hence it has the name of black-leg or quarter-evil among veterinarians and cattlemen. This bacillus does not produce subcutaneous discolorations. 7. Malignant edema is found in chains of six, eight, and ten, as well as in single bacilli. This bacillus is not found in chain of more than two, and most frequently as single bacilli with

rounded ends. Its possessing a capsule, being anaerobic, and retaining the stain after Gram's method differentiates it from all other known bacilli, and makes its distinction complete and corresponds in every respect to the one described by Welch and Nuttall. I pronounce it according to these investigations the bacillus ærogenes capsulatus.

From the foregoing experiments and observations I deduce the following conclusions:

1. That infection from the bacillus ærogenes capsulatus occurs much more frequently than is recognized.

2. That it dominates the whole field of pneumo-pathology (Welch).

3. Such terms as emphysematous gangrene, air embolism, emphysematous cellulitis are misleading and vague, and should become obsolete.

4. That infection from this germ produces a rapid toxemia; formation of gas in infected areas, resulting in gangrene and death.

5. Its principal habitat is the soil and intestinal tract.

6. Owing to its wide distribution in the soil, the danger of infection in all traumatic cases should not be forgotten.

7. A probable diagnosis can often be made by the history, clinical course, and objective signs of the case.

8. A positive diagnosis can only be made by bacteriological examinations, culture, and animal inoculations. Simple stained specimens taken from the site of infections will often make the diagnosis.

DISCUSSION.

DR. CHARLES DAVISON, of Chicago, Ill.—Mr. President: I know very little about cases of infection from the bacillus ærogenes capsulatus. Last summer, at the Cook County Hospital, a case was brought in in which this germ was isolated and cultured from the arm of a child. The arm of the child was amputated and the child's life saved. It is said that the internes who handled the arm of this child dressed some other cases, and one patient died from the same trouble, showing the activity of the germ.

DR. THORN.—I would like to ask how long after the discovery of the condition was the operation made?

DR. DAVISON.—I do not know.

DR. S. S. THORN, of Toledo, Ohio.—It is a pity to let such a paper as this pass without further discussion. Everybody who knows me knows that I am not a bacteriologist. But I have had some experience with surgical diseases and conditions, and I had the pleasure of seeing the patient referred to in this paper. The operation was delayed for some considerable time after evidences of gangrene had presented themselves. The cause of the gangrene was not known. I saw the case in consultation the day before amputation was resorted to. I advised against amputation in this case, not because of my bacteriological knowledge or ignorance, but because of the traditions and experiences which I had obtained from long years of practice and observation. I believe, however, after hearing this paper, that there is an opportunity for operative procedures in such cases. But operation must be done early. If it is delayed long enough for constitutional contamination to take place, then it is of no use. I have thought, with one of the great German surgeons, that we will have the same regrets if we operate. If I remember rightly, this distinguished gentleman said: "Do not regret if you have not operated, and your patient should die, because he would have died earlier had you operated." If at the beginning of evidences of gangrene a bacteriological examination had been made in this case, the possibility of success might have obtained or existed. But the patient was allowed to go on day after day, when the infection was so complete, as the doctor described, that an operation was without any hope.

I am very much obliged to the essayist for his excellent paper, because it has set me thinking in a direction in which I have heretofore paid but very little attention.

DR. DAVISON.—In the case I spoke of the diagnosis was unquestionably correct, for the germ was isolated by a competent bacteriologist.

DR. L. B. TUCKERMAN, Cleveland, O.—A case of this character occurred in Cleveland a year ago. I feel somewhat hesitant about reporting it, because there was no bacteriological examination made, and consequently the record is incomplete. Unfortunately we were not so situated that we could make proper culture experiments, but all the clinical symptoms were present. The patient, a young man of 21 or 22, had sustained a compound fracture of the lower portion of the right thigh by being thrown from a street car onto a

muddy pavement. The soft tissues were severely lacerated. Shock was extreme, and immediate amputation was not done. Within a few hours the tissues about the wound began to become emphysematous, and the emphysema spread upward, extending above Poupart's ligament. The skin had the usual jaundiced look, and the gross appearances were typical. The thigh was amputated at the junction of the middle and upper third and dressed to promote the freest drainage. The patient slowly recovered. Possibly the large drainage surface of the amputated thigh may have contributed to the patient's recovery. At any rate, where so large a proportion die it is worth while to put on record those who get well.

DR. JACOBSON (closing the discussion).—I do not know that I have very much to say other than to refer to one or two points which I desire to emphasize. I am thoroughly convinced that infection from this germ occurs more frequently than is recognized. All of the older practitioners present can remember cases of gangrene characterized by gaseous accumulations in the tissues, likewise gas accumulations accompanying other condidions. Unquestionably these infections are brought about by the bacillus ærogenes capsulatus. It is a different thing if one possesses a microscope and has the facilities for carrying on bacteriological work and conducting cultural and animal experiments. The point I desire to make is this: If you do not have facilities for making animal inoculations and cultural experiments, simple specimens, properly stained, will reveal thc bacilli, and a diagnosis can frequently be made from them. A physician possessing only a microscope can make the diagnosis. Sometimes the clinical course and symptoms will enable one to make the diagnosis without the aid of the microscope.

XXXII. MOVABLE LIVER—HEPATOPEXY.

By J. H. CARSTENS, M. D.,
DETROIT, MICH.

As there are but few cases of movable or floating liver recorded, I thought it might be interesting to report a case. Naturally it is more difficult to diagnose a movable or floating liver than a floating or movable kidney. Although some authors have reported cases as movable liver, some have as floating. There can not be that amount of mobility in the liver that we find in the kidney. Perhaps it would be well to settle on some definite term for this condition. In the vast majority of cases there has been a general condition of ptosis of the abdominal viscera, but in some cases it has been limited apparently to the liver. Briefly my case is as follows:

Mrs. R., Elkhart, Ind., aged 48, a patient of Dr. Mast, past the menopause; married a second time, but never had children. She is a hard-working woman, weighs about 220 pounds and never had been seriously ill, but has had the usual symptoms of the menopause well marked. During the last year she has been troubled with pain in region of the liver extending down to the pelvis, a sensation of fullness and distress, sometimes was obliged to keep in bed for half a day or two days; occasionally she was jaundiced for a few days. All symptoms indicated some diseased condition of the liver, but no symptoms of gall stones, no severe colic; just a feeling of fullness and distress. Her bowels were inclined to be constipated; her digestion was good, although she complained a good deal of gas. The nervous symptoms were also well marked, with hypochondriasis, a feeling of despondency, as we so often find in disturbances of the digestive system.

Examination.—Stout, heavy woman, where it is difficult to make any positive diagnosis of abdominal trouble. Percussion on the right side down to the pelvis indicated a tumor, or solid mass, the character of which could not be made out, but it might be an enlarged liver, tumor of the

kidney, an ovarian tumor developed in that direction, or possibly a long pedicled fibroid. It might also be a malignant growth, although the general appearance of the patient would discredit such condition. Besides it might be one of those very rare tumors sometimes found, such as a hydatid or a cyst of some other organ attached to the right side.

The growth did not seem very movable and I did not pass an opinion on the character of it, but suggested an exploratory operation and agreed to do whatever was indicated.

She was prepared and operated upon on April 24, 1900. An incision made at the outer edge of the rectus two inches below the ribs and downward for two and a half inches. After cutting through a thick layer of fat and opening the peritoneum, I found that the enlargement was the liver, the right lobe being very much enlarged and hanging down to the brim of the pelvis. It could be moved and easily replaced in its normal position and then projected about two inches below the ribs. There were no gall stones, and all other abdominal organs seemed normal.

The only thing to do, it seemed to me, was to fix the liver in its normal place as nearly as possible. I, therefore, scraped as thoroughly as I could the anterior side of the liver and the anterior wall of the peritoneum, so as to get it thoroughly denuded of epithelium and allow adhesions to take place. I then brought the raw surfaces together, took hold of the coronary ligament and brought it forward and stitched it to the upper angle of the wound. Then I closed the abdomen with dry sterilized catgut in layers and dressed the wound as usual. The patient made an uninterrupted recovery. Nearly all her symptoms had disappeared when she left the hospital on the 20th day. I heard of her three months later, still much improved, but occasionally troubled with gas.

From the cases following, which are all that could be found, we can see with reasonable certainty that the cause of a movable liver is always an injury, severe fall, heavy lifting, or, in a few cases, the development of a malignant growth in the liver.

The symptoms of a floating liver are a distress and feeling of weight in the region of the liver; often a good deal of tympanites and symptoms of intestinal indigestion. The action of the bowels seems to vary, even in the same individual; sometimes diarrhea and sometimes constipation is

present. The nervous symptoms can not be all enumerated; they are as numerous as we get in hysteria. They are (as we find in all reflex nervous conditions of other organs) headaches, restlessness, hypochondriasis, gastric disturbances, etc. Quite a few of these cases cause no symptoms at all except the sensation of weight, and patients were quite comfortable when wearing a bandage.

Few attempts have been made so far to relieve this condition by operative interference. In the case of Dr. Binnie, a simple exploratory operation was made and the diagnosis cleared up. Others made exploratory operation, but few attempts at a radical cure.

In cases of general enteroptosis the abdominal bandage will be valuable, as recommended by Einhorn. In such cases operation will be of no benefit, as we have to deal with a general condition of the system.

I report my case for the purpose of calling attention to the condition, which is certainly rare, and still, by being on the lookout for it, perhaps a good many more cases would be found than we suspect, especially in those chronic abdominal troubles with no marked symptoms.

I also report this case for the purpose of calling attention to the fact that operative procedure will offer a radical method of cure.

Only about one hundred cases have been reported. I have had the medical literature looked over carefully, and find the following cases:

A. Catini (*Ann. univ. do med.*, Milano, 1866, cxcviii, 373) reports a case with severe nervous symptoms, patient aged 54. The organ could be replaced.

R. Piatelli (*Riv. clin. di Bologna*, 1868, vii, 239–243) reports a case of a woman aged 56. The bandage could not be worn.

E. A. Meissner (*Schmidt's Jahrb.*, Leipz., 1869, cxcl, 107–114) gives a case of a married woman aged 39. Displaced liver apparently following pregnancy. Was much improved by wearing bandage.

G. Barbotta (*Morgagni*, Napoli, 1870, xii, 848) states a case of a woman aged 37, also caused by parturition.

F. Vogelsang (*Memorabilien*, Heilbron, 1872, xvii, 67–69) reports a case of a very quarrelsome woman of middle age, with a floating, movable liver, which was caused by tight lacing.

F. N. Winkler (*Arch. f. Gynaek.*, Berlin, 1872, iv, 145–156) reports a case of a woman aged 29. General ptosis following lifting heavy burden; stabbing pain in the right side. It could be moved to the left side.

P. Muller (*Deutsche Arch. f. klin. Med.*, Leipzig, 1874, xiv, 146–149) states a case of a woman, aged 57, with a movable liver complicated with an ovarian tumor. Verified by autopsy.

Salomone-Marino (*Observatore med.*, Palermo, 1874, 3.s., iv, 185–224) gives a case of a woman aged 50; had pain only on turning on left side. He also reports a second case of a woman, aged 48, movable liver, the result of a fall.

G. Leopold (*Arch. f. Gynaek.*, Berl., 1874–5, vii, 152–168) states a case, woman aged 54, poorly nourished. The liver could not be replaced.

C. Vicoli (*Morgagni*, Napoli, 1875, xvii, 852–854) gives a case of a woman aged 70, with the cause given as excessive lacing.

W. Sutugin (*Arch. f. Gynaek.*, Berl., 1875, viii, 531–533) reports a case of a married woman at the age of 41, which was much relieved by wearing bandage.

G. Tempini (*Gazz. med. Ital. lomb.*, Milano, 1875, 7.s., ii, 233, 242, 249) states a case of a woman aged 72 (accompanied by heart lesion), which could be replaced and kept there by hands.

N. P. Wassiljew (*St. Petersb. med. Wchns.*, 1876, i, No. 30) gives a case, aged 39, where the spleen was also very movable and a movable kidney on the right side. He also reports a second case: A coachman, aged 31, was taken with a violent pain on the right side. Great exertion.

A third case, of a carpenter aged 47, seemed to have been caused by severe cough.

L. Concato (*Riv. clin. di Bologna*, 1876, 2.s., vi, 65–68) tells of a case, woman, aged 60, had pain. Very tight lacer; was relieved by bandage. Finally died, but there was no autopsy made.

F. Chovstek (*Wien med. Presse*, 1876, xvii, 10, 885, 921, 976, 1008) gives a case of a married woman of 53, mother of twelve children. Labors always very difficult. Was ordered to wear bandage.

L. W. Blet (*Etude sur le foie mobile*, 4 to, Paris, 1876) reports two cases, without giving age or the histories. Both died from heart lesion.

F. Koehler (*Beitraege zur. Casuistik der Wanderleber*, 8 Greifswald, 1877) states a case. Married woman of 54 had falling of womb, which was relieved by a pessary. Liver could be replaced and held with the hand. Had no pain.

W. Pepper (*Med. and Sur. Reporter*, Phila., 1877, xxxvii, 350) states a case, married woman, 41; occurred after childbirth, accompanied by flatulency.

J. W. Legg (*St. Barth. Hos. Rep.*, London, 1877, xiii, 141–148) reports a case of a man, aged 36, with decision apparently due to coughing. Verified by autopsy.

F. Chovstek (*Allg. Wien med. Ztg.*, 1877, xxii, 330) reports a case. Woman, aged 68, accompanied by dropsy and swelling of the lower extremities.

C. Hochhalt (*Med. Chir. Central. Wien*, 1879, xiv, 554) gives a case of a man who had raised a heavy sack, and sank down senseless. Elastic bandage and pad given as the relief.

H. Rodsewitch (*St. Peters. med. Wchnschr.*, 1879, iv, 324) reports a case of a woman of 18. Tight lacing during pregnancy caused movable liver.

F. Chovstek (*Wien med. Bl.*, 1880, iii, 755, 784) gives a case. Man of 45, great beer-drinker, led a sedentary life. After gymnastic exercise found floating liver. Had a little trouble from it.

J. W. Runeberg (*Finska lak.—salisk. handl.*, Helsingfors, 1881, xxiii, 279) reports a case. In session of May 7, 1881, Runeberg showed a woman with a floating liver, and also spoke of another case reported by him. Pippingskold spoke of a case of dislocated liver observed by him many years since in a woman of 50 years, which was brought on after severe puerperal peritonitis; she died afterward of carcinoma of the uterus and the dislocation was confirmed at the autopsy.

F. Schott (*Deutsche Med. Ztg.*, Berl., 1882, iii, 247, 259) gives a case of a married woman of 40. Jaundice for five or six years; during this time had repeated attacks of vomiting, diarrhea, constipation, general weakness, and was greatly emaciated. Catarrh of the stomach, bronchitis, etc. Found a floating liver, and ordered a bandage with a pad. After ten months patient was much improved and stronger.

J. Trush (*Obst. Gaz.*, Cincin., 1882, v, 337–343) reports a case of a widow, aged 68. Movable liver following a severe fall. Verified by autopsy.

Nicola De Dominicis (*Manuale di semiotic fisica ad uso dei giovani o dei medici practici*, 8 Napoli, 1883, pt. 1, 113, note) reports that he observed some years ago a woman who had a wandering liver in whom, having married and then become pregnant, the liver was returned to the normal place by the pregnancy and was not again displaced.

F. Schwartz (*Wien med. Bl.*, 1883, vi, 695–700) gives a case of a man, aged 38, fever and chills occasioned with jaundice. Returned to the hospital a number of times.

Julius Kranols (*Zur Casuistik der Wanderleber*, 8 Stuttgart, 1884) reports a case. Married woman of 38, accompanied with dropsy. Post-mortem showed cancerous liver.

J. Penna, diagnosed by J. B. Arini (*An. del Cerc. med.*, Argentine, Buenos Ayres, 1884, vii, 131–136) reports of a young girl. Noticed her clothes were too small around the body. Floating liver diagnosticated and confirmed by Arini. Relieved by special corset.

J. Maack (*St. Peters. med. Wchnschr.*, 1884, n.F., i, 410) gives a case of a single woman of 35. Had a tumor in the right side, in the ileo-cecal region, which was found to be a liver and could not be relieved by bandage.

G. Kispert (*Berl. klin. Wchnschr.*, 1884, xxi, 372–375, wood cuts) states a case. Married woman of 43 had severe labors followed by fever. Afterward tumor was found, in fact two, with an hourglass-like contraction.

S. Salome-Marino (in his *Studi di clin. med.*, 8 Palermo, 1885, 185–224) reports a case. Single woman, middle body causing trouble when she walked. Attacked with peritonitis in 1873, which caused fixation of the liver in the right ileo-cecal region. He reports a second case. Washerwoman of 49, who died of hemiplegia.

Another case of a woman of 33, had severe tympanites. Another of a woman aged 44. Died of sarcoma of the jaw. Autopsy. Another of a man aged 55; only history of intermittent fever, tympanites. Also a case of a married woman, aged 34; poor digestion brought on after her sixth confinement. Another of a woman, aged 21, a silk worker. Caused by lifting a heavy weight. Also reports a woman, aged 27, apparently followed after dancing until she was exhausted five or six evenings in succession.

A. Perrone (*Morgagni*, Napoli, 1886, xxviii, 585–593) gives a case of a married woman, aged 58, who fell down stairs. Very movable.

H. Rosenkranz (*Berl. klin. Wchnschr.*, 1887, xxiv, 715) states a case. Married woman, aged 48, was seized with severe vomiting, pain in the abdomen. This was followed by ascites in the edema of the legs. This disappeared after two months. Dislocated liver was found, which could be turned without trouble on its sagittal axis.

R. Pichevin (*Progres Med.*, Paris, 1888, 2.s., vii, 253) states a case of a movable lobe of the liver and a floating kidney.

K. Szigethy (*Pest med.-chir. Presse*, Budapest, 1889, xxv, 1013) gives a case of a man of 42, difficulty of breathing, jaundice with ascites caused by wandering liver.

E. H. Parker (*N. York M. J.*, 1889, xvix, 656–658) reports a case of a child, ten months old, with a tumor which he thought was a movable liver, but which was pronounced sarcoma of the kidney by others.

E. Maragliano (*Riforma med.*, Roma, 1889, v, 2, 8, 14, 20, 26, 74, 80, 374, 380) reports a case. Woman, 51 years old, movable liver; evidently accompanied or caused by cancer.

George Curtius (*Symptome und Aetiologie der Wanderleber in Anschluss an einen solchen Fall.*, 8 Halle a.S., 1889) gives a case of a married woman, aged 41, very movable liver, which was relieved by wearing a flannel bandage.

M. Einhorn (*Med. Monatsschr.*, N. Y., 1889, i, 351–353) states a case. A carpenter by trade, aged 57, always healthy, came on suddenly, severe chill, dizziness by vomiting and pain.

Gonterman (*Deutsche med. Wchnschr.*, Leipzig, 1890, xvi, 1043) reports a case of a girl nearly a year old, taken with whooping cough complicated with peritonitis. Was taken with diarrhea, meteorism; became greatly emaciated. After it a tumor was noticed. Sudden death, which was supposed to be due to twisting of the pedicle, although no post-mortem was made.

S. Salome-Marino (*Lavori d. Cong. di med. int.*, Milano, 1891, iw, 338–341) gives a case of a wandering liver which suddenly appeared in a girl of five years without producing severe symptoms.

J. F. Binnie (*Internat. J. Surg.*, New York, 1892, v, 332) reports a case of a single woman, aged 47, music teacher. Had a tumor on the right side three years; attack of jaundice six months before; exploratory laparotomy. On opening the abdomen a floating liver, rotated and freely movable, was found. On its surface were nodules like hepatic carcinoma.

Schtscherbakow and Rudow (same journal, 86th page) give a case of a woman, aged 35; 11 births; occurred apparently by getting up too soon after severe confinement. Wore bandage.

G. N. Kreider (*Med. News*, Philadelphia, 1893, lxii, 436) reports a case of a veteran of the civil war; was thought that the liver was loosened by lifting very heavy casks. Patient declared that he suffered no inconvenience from the organ.

Richelot reports a case of painful movable tumor in the right iliac fossa, which proved to be the displaced liver. He operated and three months later the relief was still complete. (*L'Union Med.*, Aug. 5, 1893–4.)

Dr. V. Poli reports a case of movable liver in a woman, aged 29. He operated with success. (*Riforma Medica*, vol. 9, 7, 105, 1893–4.)

M. Albert Mathien reports a floating liver in a woman, aged 53, operated; recovered. (*Gaz. des Hôpitaux*, Oct. 24, 1893–4.)

J. Buchholz records a case of floating liver in a widow, aged 50; abdominal bandage applied; complete recovery. (*Norsk Magazine for aegevidenskaben*, vol. 8, 1893–4, 9, 994.)

Dr. S. Weissenberg, of Jelissawetgrad, reports a case of hepar migrans s. mobile, as follows: F. H., female, aged 43; abdominal bandage gave temporary relief. Operation refused; patient died later. (*Deutsche Med. Wochenschrift*, Nov. 30, 1893–4.)

Prof. W. Leube, of Würzburg, Germany, reports a case of floating liver, as follows: S. H., peasant's son, aged 17; operation; recovery. (*Munchener Med. Wochenschrift*, Jan. 23, 1894.)

Dr. Benjamin Hellier, M. R. C. S., reports a case of enlarged gall-bladder with linguiform appendix of the liver in a married woman, aged 32. Exploratory incision made. Patient made excellent and rapid recovery. (*Brit. Med. Jour.*, May 4, 1896.)

Bastianelli operated in a case of floating liver in a woman, aged 37. A diagnosis of cancer and displacement of kidney had been made. Good recovery. (*Policlinico*, 11, Rome, April, 1895.)

Lannelougue and Faguet, of Bordeaux, operated in a case of floating liver, diagnosed as tumor of large intestine. Good recovery. (*La Semaine Medicale*, Aug. 7, 1895.)

Dr. J. E. Graham, M. R. C. P., London, reports three cases of movable liver:

CASE 1.—Female aged 62. Abdominal bandage used; patient made rapid recovery.

CASE 2.—J. R., aged 32; patient died from other causes; post-mortem revealed floating liver.

CASE 3.—M. T., boy, aged 17; transposed and movable liver. Treatment not stated. (*Canadian Practitioner*, 1895, vol. 20, p. 399.)

Bobroff reports a case of movable liver in a woman aged 50 years; laparotomy, marked improvement. (*Wratsch*, 1895, No. 46, p. 1299.)

Glubinsky reports a case of movable liver in a female, aged 38; operation; complete recovery. (*Voiyeny Med. Jour.*, Nov., 1895.)

Dr. Frederick A. Packard reports a case of floating liver in a male laborer, aged 40. Exploratory puncture was made. Recovery. (*University Med. Mag.*, 1896–7, vol. 9, 9, 266.)

Pean records a case of movable liver in a female, aged 29 years; operation; complete recovery. (*Congres de Chirurzie*, Paris, Oct., 1896.)

Dr. Felix Franke reports two interesting cases of floating liver as follows:

CASE 1.—A. Sch., woman, aged 23; operation and subsequent good recovery.

CASE 2.—H. W., widow, 41 years old; laparotomy, good recovery. (*Centralblatt fur Chirurgie*, 1896, vol. 23, p. 775.)

Areilza reports a floating liver in a male, aged 20 years; laparotomy; recovery. (*Rivista di medicina y cirur goa practica*, 5 *jiullet*, 1896, p. 24.)

Delageniere records a case of floating liver in a female aged 30 years; operation and complete recovery. (*Archives provinciales de Chirurgie*, 1897.)

J. Lucas-Championniere reports floating liver in a female, aged 35; median laparotomy. Recovery. (*Gaz. des Hôpitaux*, April 1, 1897.)

R. Crawford reports a case of "anteverted, wandering liver" in a woman, aged 65; post-mortem revealed above condition. (*Lancet*, Nov. 6, 1897.)

Blanc reports an interesting case of movable liver in a woman, aged 35; vertical incision made; perfect success; rapid recovery. (*La Loire Med.*, Dec. 15, 1897.)

P. Ferrari reports a singular case of floating liver in a girl, 24 years old; operation and recovery. (*Centralblatt fur Chirurgie*, 1897, vol. 24, p. 1301.)

Dr. H. MacNaughton-Jones reports a case of complete laparotomy in a female, aged 38. Splendid recovery. (*Med. Press and Circular*, May 18, 1898.)

Dr. Aristide Muratori reports a case of movable liver, the result probably of carcinoma, in a male laborer, aged 61. Operation and recovery. (*Gaz. degli 6 spedali e delle Cliniche*, 1898, Nov. 20.)

Prof. Einhorn, of New York, reports five cases of movable liver, as follows:

CASE 1.—Sarah D., aged 37; abdominal bandage; rapid improvement.

CASE 2.—Aged 50; abdominal bandage; rapid improvement.

CASE 3.—Female, aged 55; abdominal bandage; improved immediately.

CASE 4.—David L., aged 41; abdominal bandage ordered; marked improvement resulted.

CASE 5.—A. S., 25 years old; full diet and bandage ordered. Marked improvement.

Einhorn reports four other cases of movable liver, diagnosed incorrectly; three were pronounced cancer of stomach, the fourth as either appendicitis or gall stones. Bandage relieved all symptoms. Among five other cases, wrongly pronounced gall-stone colic, was that of a man aged 60. Adjustment of bandage resulted in great relief. (*Zeitschrift fur Diatatische und Physikalische Therapie*, Leipzig, 1900.)

Dr. N. O. Nisbet, of Charlotte, N. C., reports movable liver in a woman, aged 45. Abdominal bandage relieved all symptoms. (*The Carolina Med. Jour.*, Feb., 1901.)

DISCUSSION.

DR. A. M. HAYDEN, of Evansville, Ind.—Mr. President: This paper has been very interesting to me, simply because I have had a case similar to the one reported by the essayist, but which has never been recorded or published. It occurred in a girl, seventeen years of age, about nine years ago, who was referred to me by a physician for the removal of a pelvic tumor. When she consulted me I discovered a tumor which occupied the pelvis; I was uncertain as to the nature of the tumor, and advised an exploratory incision. I opened the abdomen and found the liver down in the pelvis, the top part of this organ being on a line with the umbilicus. I tried to lift it up, but could not do so; on account of adhesions, I was afraid to manipulate it very much. I closed up the wound, the patient recovered and is still living, in the neighborhood of Lockport, Ind., about forty miles from Evansville. I have been trying to keep track of the case. I do not think anything else has been done except what I did for her.

DR. WILLIS G. MACDONALD, of Albany, N. Y.—It seems to me that the paper presented by Dr. Carstens this afternoon is a rather important one, calling our attention to a condition which is sometimes exceedingly troublesome, so far as the differential diagnosis is concerned, and which is capable in certain cases of producing very distressing symptoms. It has been my fortune to see a considerable group of such cases. I do not quite understand, out of the great experience that Dr. Carstens has had, why more of these cases have not come under his observation. I think he will remember that some years ago, at a meeting of the American

Association of Obstetricians and Gynecologists, I showed the lobe of a floating liver with the gall-bladder and some gall stones. Of course, pathologically this condition is associated with one lobe, or it is part of that general condition of Glenard's disease in which we have very relaxed peritoneal ligaments everywhere. I have seen two cases in which there was general ptosis of the liver, one in which by the change of position of the patient it was quite possible to have the liver float down beyond the borderline of the umbilicus, and changing the position of the patient back again have it disappear beyond the border of the ribs. Those cases are not, however, in my opinion, the important ones. We find this condition of a movable liver frequently in Glenard's disease, but it is in that class of cases in which the right lobe of the liver is implicated by a tumor that we are prone to make a mistake.

During last summer I started out to do an operation on the gall-bladder and found such conditions as have been presented by Dr. Carstens, believing that the tumor which I was examining, from the clinical symptoms presented, was one of distended gall-bladder and gall ducts. In the other cases, two of them, I supposed I was operating for appendicitis, in one of which I removed a portion of the right lobe of the liver and the gall-bladder, containing gall stones, in the belief I had to deal with a tumor of this lobe of the liver, which proved to be an infectious process.

Technically, a great deal may be said with relation to the procedure which we will employ. Certainly it would be seldom that any surgeon would remove a portion of the liver for this condition. It is a perfectly feasible operation, but there will seldom be occasion for its performance. It seems to me the procedure employed by Dr. Carstens in this case is a very valuable one; yet, on the other hand, I think it will appear to him that in some cases an operative procedure is not sufficient; that more is required than the fastening of the peritoneal surface of the liver and in shortening the coronary ligament. It is feasible to use the gall-bladder for the purpose of suspending the liver under the border of the ribs and suturing the fundus of the gall-bladder to the top of the wound. I have found no serious results following the use of round needles and catgut and the application of three or four sutures under the right border of the liver to the costal margin of the right side.

XXXIII. VARICOSE VEINS AND THEIR TREATMENT.

By J. LIVELY JOHNSON, M. D.,
Louisville, Ky.

The varicosity of veins is a condition of which comparatively little is known; but, upon the other hand, we know it is a malady with which many of our fellow-men are afflicted.

Varicose veins of the first degree, or in the incipiency of the variocosity, are of little importance, aside from the mental anxiety of the patient; but we must not forget that varicose veins assume a more grave character and prove themselves quite a source of annoyance and trouble.

It is a well-known fact that a varicose condition of the veins may exist in any part of the body, although this condition of the veins is found most frequently in certain localities.

The pampiniform plexus of veins which is located along the lower end of the spermatic cord is one of the most frequent sites for the development of varicosity. This trouble may exist here for an indefinite length of time, producing comparatively little discomfort; again it may be accompanied by a dragging sensation of pain and atrophy of the testicle. The more aggravated cases prove of a very serious nature to the patient. There is not alone the dragging pain and atrophy of the testicle, but a severe lumbago is often the most prominent symptom, and one which can only be remedied by operative procedures; this consisting of a complete extirpation of the varicose plexus by Bennett's method, with which we are quite familiar.

Again we often find a varicose condition of the veins of the foot, leg, and thigh, involving both the superficial and deep veins of the limb.

It is to this pathological condition of the veins that most of the indolent ulcers of the leg are due; it is also due to this condition they are so inamenable to treatment, the elasticity

and contractile power of the veins being largely lost; the circulation is rendered poor, thus permitting a large column of almost stagnant blood to lie in the vessels, exerting its indolent pressure upon the already weakened parts, inducing as it does a necrotic condition of the tissues.

When the veins become dilated to an extent sufficient to allow the pressure produced by the column of blood to paralyze the capillary circulation in the skin, then it is that the tissues slough and we have what is termed in medical parlance varicose ulcers.

The cause of this condition of the veins is not as well understood as it should be; nevertheless, we are conversant enough with the subject to know that varicose veins may, and often are, superinduced by certain forms of disease, injuries, occupation, pregnancy, etc.

Varicose veins are in some instances said to be congenital, they are most frequently observed in the aged, but often begin between the ages of twenty and forty. It is well known to the profession that varicose veins are more common in women than in men, because of the influence of pregnancy.

Hemorrhoids, or varix of the hemorrhoidal veins, is due to an obstruction or a stasis of the blood in these vessels, which is due either to obstructive liver disease, enlarged uterus or prostate, or perhaps the pressure in the rectum of an accumulation of feces in one habitually constipated.

Veins are not only dilated but they grow larger and become very tortuous; their walls are very thin, rendering them easily ruptured.

They cause edema, and the watery elements of the tissues cause eczema of the skin, this condition often being followed by inflammation, suppuration, and ulceration.

This discoloration of the skin in varicose conditions is often the result of pigmentation, due to the red blood corpuscles having escaped into the tissues and becoming disorganized.

One of the greatest dangers and annoyances to the patient is the possibility of a sudden rupture of the veins, with perhaps a fatal loss of blood. There is also a liability of inflammation and thrombosis frequently occurring.

This pathological condition of the veins renders the patient incapacitated to a more or less degree, from a physical standpoint, to participate in the spoils offered by government positions in the army or navy, also from most if not all athletic sports. The physical accompaniments of this condition is not the worst of the patient's ailments, as he is often found to be a chronic brooder over his condition, and as we all know this is not conducive to recovery.

Every practitioner of medicine can recall more than one interesting case of varicose ulceration of the leg or rectum which was a great source of annoyance to him. If this could prove so troublesome to the physician, what can be said of the patient who was the unfortunate victim of the varicosity?

This brings us, gentlemen, to a more interesting portion of this paper, the treatment of this pathological condition.

It certainly appears strange in this enlightened era—the beginning of the twentieth century—that physicians and surgeons still permit their patients, suffering from varicose veins and ulcers, to indefinitely pursue their daily avocations with simply a little oxide of zinc ointment and a roller bandage applied to hold it in place. This character of treatment can not possibly be of the slightest service to the patient; while, upon the other hand, it does harm by maintaining the ulcer in a soggy condition; neither does the roller bandage as it is generally applied support the column of blood to a degree sufficient to aid materially the circulation.

The rubber stocking so often employed to support the blood column has likewise proven a failure. Aside from its inability to support the circulation it becomes soiled and rancid from perspiration, and this, with its constant contact with the parts, often produces a very annoying dermatitis.

Another serious objection to this plan of treatment is that we can not hope for a cure, but instead, the treatment must be persisted in as long as the patient may live, this not affording an encouraging prospect for patient or surgeon.

I believe the only rational plan of treatment to be pursued in the management of a varicose condition of the veins, in whatever locality, is as near as possible a complete extirpation of the diseased vessels.

Every case of varicocele that gives the patient any trouble, either of a physical or mental character, should be relieved by extirpation of most of the veins of the pampiniform plexus according to Mr. Bennett's technique. So should all cases of hemorrhoids be cured by excision of the entire varicose mass.

This brings us to a group of vessels, when varicose, that tax our skill and ingenuity to a far greater degree than do either of the above. I refer to the vessels of the foot, leg, and thigh, for it is to these that we owe our most utter failures so far as relief is concerned, unless surgical treatment is instituted.

I believe that temporizing with this class of cases not only does the patient much and permanent injury but brings reproach upon the profession as well.

The surgeon has the choice of a number of operations for the radical cure of variocosities of the lower extremity. He must be able to adapt the surgical procedure to the case in point. The veins may be ligated some two or three inches apart throughout the extent of the varicosity; this technique is better applied to a single vein.

Secondly, Schede's operation may be employed in many cases, which consists of a circular incision entirely through the skin and superficial fascia to muscles at the junction of the middle and upper third of the leg; all bleeding points are ligated and the skin wound closed.

A third operation, and one of the best, devised by Phelps, consists in excising about two inches of the long saphenous vein at several different points along the course of the vessel.

The most radical form of treatment consists in placing a tourniquet around the thigh, rendering the varicose vessels very prominent, incising and dissecting the skin well back, exposing, ligating, and completely removing all diseased vessels.

It should be bourne in mind that all operations performed upon veins must be done under the most perfect asepsis.

It has recently been my pleasure to read an interesting paper by John O'Connor, M. D., Medical Officer in the British Hospital, Buenos Ayres, in which he reports forty consecutive cases of complete extirpation of the diseased vessels, and in only one instance did he experience any serious post-operative complications, edema of the left leg and thigh. This was in a very bad case of varix, in which he was compelled to remove the greater part of both the internal and the external saphenas. However, by persistent massage, the edema subsided and the patient has since been quite well for the past three years.

A thorough exposition of a mass of varicose veins will convince any fair-minded man that any procedure short of a complete extirpation of the diseased veins would be sheer folly and unscientific in the extreme. Owing to the labyrinthal distribution of the veins, incision and ligation would necessarily prove futile.

One of the most serious complications encountered in extirpating varicose veins is the liability to buttonhole the skin flaps; should this occur it prolongs the convalescence indefinitely. This may be prevented by keeping the edge of the knife directed toward the vein during the dissection, even at the expense of wounding the vessel, which, after all, is a small matter and may be easily remedied by clamping the wounded vein with the hemostatic forceps.

This technique is employed by O'Connor: The limb having been shaved and disinfected from Poupart's ligament to the ankle, a two-inch incision is made over the saphenous opening and the internal saphenous vein ligated at two points,

about an inch apart. Now, if no varicosity exists above the knee, the wound is closed and aseptically dressed at once, otherwise the femoral portion of the vein is dissected out, ligating its branches as they are reached. This dissection must be continued down over the course of the vein to the full extent of the disease.

O'Connor states in one case upon which he operated he made an incision twenty-seven inches in extent, from which he removed some forty-three inches of diseased internal saphenous vein and its branches.

Should the varices not extend above the knee, after the saphenous vein has been ligated at the saphenous opening and the wound closed, an incision is made over the affected portion of the vein below the knee, a ligature applied both above and below, and the whole of the intervening mass removed by a thorough dissection; all branches are caught up with hemostatic forceps, and after the removal of the main mass they are ligated with fine catgut.

When the external saphenous vein is affected it is dealt with in the same manner.

This plan of procedure may seem formidable, yet if the internal saphenous vein is previously ligated at the saphenous opening there is little danger of emboli.

The same surgeon has successfully employed this method for the relief of thrombosed veins occurring during pregnancy and phlebitis-extirpation, giving complete relief.

DISCUSSION.

DR. H. O. WALKER, of Detroit, Mich.—Mr. President: I am fully in accord with almost everything that the essayist has said on this subject. However, I do not think it is absolutely necessary to practice the entire enucleation of the vein, for we know in varicocele where we make exsection of a portion of it we get just as good results as where we make a more complete operation. In these cases I have been in the habit of doing a modified Schede operation. I do not make

a complete circular incision, although one of the photographs I have here of a case shows that I did it in that instance, making a circular incision at the anterior portion below the knee for a space of about three inches. I do not think this is necessary. There has been objection raised to this method from the fact that it produces anesthesia, which in my opinion is conducive to better ultimate results. The after-treatment consists in putting the leg in an elevated position, but I think we can do much better where we let the leg assume the horizontal position instead of being elevated. I have here some photographs illustrating the Schede method and the results in one instance.

I think this is a very important subject, one that has been neglected. There are very many individuals going around with large varicose veins that are inconvenient but not dangerous, and a simple operation would relieve them. There is one thing to be emphasized, and that is the necessity of making a careful aseptic operation.

DR. D. N. EISENDRATH, of Chicago, Ill.—The first thing we have to consider, in talking about the treatment of varicose veins, is the pathology of it. I had occasion to make a number of sections of varicose veins, and stained them with the Kaiserling stain for elastic fiber, and found one characteristic of them. In the elastic fibers in the normal vein there is a firm band continuous around the inner coat of the vein, not, of course, as large as an artery. In varicose veins, when stained for elastic fibers, the first thing noticeable is this, that instead of there being continuous elastic fibers they are broken into little pieces. That is essentially the pathology of varicose veins. There is a loss of elasticity in the vein wall.

The whole problem in the treatment of this pathological condition is, how can we transfer the column of blood, and how can we transfer the pressure from the surface to the deeper parts, so as to bring about return circulation? The circulation takes place along the venæ comites instead of taking place in the subcutaneous vein.

Now, the elastic stocking and other methods that have been spoken of are only palliative. The only way is to operate. There have been almost as many methods for the treatment of varicose veins as there have for a good many other conditions, and the results have not been satisfactory. This means that every one has a method of his own, but there is no one method which has met all the indications and has accomplished the results desired.

As regards the Schede method, which was referred to by Dr. Walker, making an incision all around the entire leg, this is a very important one. So far as I know, it was original with Dr. Ochsner, or at least he was the first to call attention to it in a local medical society in the case of a patient upon whom a Schede operation had been performed by another attending surgeon at the Cook County Hospital, in which the circular incision had included the entire circumference of the leg, and the vein tied off. A few weeks afterward the leg became bluish in color and gangrene of one toe set in, necessitating the performance of a Pirogoff amputation. That, of course, was an undesirable and disastrous result after such a simple operation as the ligation of a varicose vein. It is an exceedingly important point not to make the incision circular, but rather perpendicular in form, leaving about two or three inches. The Schede operation, combined with circular incision, accomplishes wonderful results, and in the majority of cases there is no recurrence.

There are several points I would like to speak of in connection with the treatment of varicose ulcer, but time will hardly permit me to do so. In the first place, I wish to speak of the frequency with which some practitioners use the most violent caustics in the treatment of simple ulcers. In a case of inflamed ulcer they will use carbolic acid, bichloride solution, or some other irritating solution, so that the patient will be laid up with an eczema for months. The simplest and most effective way is to use a salt solution or a mild boracic acid solution in the form of a wet dressing. This will heal more of these ulcers than any other treatment.

We do not take into consideration as often as we should the combination of syphilis with varicose ulcer. In addition to operating on them for varicose ulcers, if we put them on antisyphilitic treatment there would be fewer recurrences.

Another point is to urge the combination of amputation of the scrotum with the operation for varicocele. We operate on varicocele, ligate the varicose vein, but leave a long dependent scrotum that will simply drag, and if there is a single vein left there will be a recurrence. I have operated on a number of these cases, doing the combined operation, and the results have been surprising. It is not necessary for the patient to wear a suspensory bandage afterward, and altogether it has been overestimated.

DR. THEODORE A. MCGRAW, of Detroit, Mich.—The last speaker has touched upon the subject of the elastic fibers as being the pathology of varicose veins. I look upon that as a

result of the distention. You take, for instance, these cases of varicocele. I read a paper before the American Medical Association a great many years ago taking issue with the general ideas regarding the pathology of varicocele. All of the causes largely given in the text-books for varicocele are simply secondary. They are minor causes. The way to get at the causes is to look at the physiology of the circulation of the veins in the scrotum, and it has to do also with the physiology of the circulation of the veins in the leg. Why is it the external veins of the leg swell? Because they do not have sufficient muscular pressure there to push up the column of blood. That is why, and then they become distended. People who do not walk, but stand, get the veins of their legs distended. What is the pathology in the scrotum? The cremaster muscle runs down and is fastened to the testes. It is continually contracting, and it is that muscle which causes the circulation which supports the veins, presses up the column of blood. A man with a strong cremaster muscle could not have varicocele. He could not have a varicocele if he has got an efficient cremaster muscle. What causes it? In varicocele, we have a number of cases in which the muscle does not act efficiently. We have a lot of cases in which there is no cremaster muscle. You cut down upon some cases and you will find absolutely no cremaster muscle at all. You take those men, stand them up, and you find that you can not get the cremasteric reflex, because there is no cremaster muscle. There is an absence of this muscle. And so you will have varicocele because there is no cremaster muscle to support the veins. In others the muscle is paralyzed. Where you find a cremasteric reflex you will find vein resistance. The muscular power may be too small to hold the testes up. When you take an ordinary strong man, you will find that the cremasteric muscle responds; it pulls the testes up. You touch the thigh and it comes up again, but in varicocele it has not the power. That is the pathology. You will find sometimes a man who has paralysis of the cremaster from some cause such as excessive venery. It does not act efficiently. The whole pathology of varicocele rests on the cremaster muscle.

DR. CORDIER.—Is there any difference in the development of the muscle on the right and left sides?

DR. MCGRAW.—Yes. Why is it that a man usually has varicocele on the left side? Because the whole muscular fiber is weaker than it is on the right. Sometimes we have varicocele on both sides, but if we are going to have it on one side, it will usually be on the weaker side—the left.

DR. WM. J. MAYO, of Rochester, Minn.—In regard to the more severe class of cases, it has been my experience that the more we excise of the saphenous vein the better.

A word or two in regard to the after-effects in the shape of old chronic ulcers that have existed for many years above the ankles of these patients. We have sometimes been disappointed in our results after skin-grafting. When the patient gets up he may excoriate the parts, and the ulcer does not always remain healed. The reason for this is that there has been a dense mass of cicatricial tissue developed below the little loops of capillaries and blood-vessels which come to the surface under the grafts previous to the cicatrization. This dense mass of cicatricial tissue underneath chokes these vessels off after a little time and the ulcer reopens and it is supposed that the operation for the removal of the veins has failed to effect a cure. That is not true. It is a new local condition produced by cicatricial tissue in the base of the ulcer. In those cases if we excise bodily the ulcer and the entire cicatricial area down to good solid healthy tissue, and then skin-graft it, it will hold.

DR. A. M. PHELPS, of New York City.—This is really an orthopedic subject. After the operation has been performed and the ulcer excised, and after skin-grafting, if there is likely to be a relapse, some mechanical support should be applied to brace the circulation, as has been suggested by Dr. McGraw. This is a very important part of the after-treatment of varicose ulcer. The elastic stocking and elastic bandage should never be used. But if you will recommend them to use stockings made of the same material as that used in making corsets for women, putting in laces with hooks, and let the patient wear them for a year or more, you may be sure there will be no relapse. It is a mechanical and orthopedic proposition after the surgeon has done his work.

DR. D. N. EISENDRATH, of Chicago, Ill.—I wish to correct the view in regard to the loss of elasticity of the vein wall. I did not apply it to varicocele, but to varicose veins of the extremities.

In regard to the cremasteric theory suggested by Dr. McGraw, it is apparently a nice theory, but if Dr. McGraw will dissect a few cadavers for this special purpose, to see how much the cremaster is developed, I think he will find such a small proportion in which it is developed that I am afraid his theory would not hold water, so to speak. Treves and many others have mentioned the fact that the cremaster in adults, after the age of puberty, ceases to become a factor of any importance; that its development is chiefly at the age of twenty or twenty-one.

DR. MCGRAW.—How about getting the cremasteric reflex?

DR. EISENDRATH.—There must be enough muscle for that, but not sufficient to act as a mechanical factor in holding up the vein. Speaking of excessive venery, I would call attention to a number of young men whom I have treated for excessive varicoceles, who had well-developed cremaster reflex, yet several of them had never had sexual intercourse.

DR. E. B. SMITH, of Detroit, Mich.—The last speaker, in referring to amputation of the scrotum, brought out a good point. I simply start well up in the scrotum and carry the incision down through to the base of the scrotum and across to the other side, and with curved scissors amputate the lower part of the scrotum, carrying it right back and up to the upper edge, near the starting point, making it a loop incision, bringing it together, leaving one straight incision, and I have had the most gratifying results.

XXXIV. TRIPARTITION IN THE STUDY OF THE FEMALE PELVIS.

BY A. ERNEST GALLANT, M. D.,
NEW YORK, N. Y.

In accepting the invitation of your worthy secretary (my dear old chum, Tuley) to address a body composed so largely of teachers, it is on behalf of a vastly greater army of practitioners and students, who not unjustly complain at the lack of systematic clearness and conciseness in the presentation of subjects upon which they desire to be enlightened and so eagerly seek after at home and abroad.

Would not more careful preparation and presentation on the part of teachers at home deter many from launching themselves, linguistically unprepared, upon the uncertain ocean of Continental medicine, only to return disgruntled, heartsore, having sought in vain their heart's sincere desire?

"To learn to classify is in itself an education." The orderly presentation of the subject, based upon a uniform plan as an aid to memory (receptive, retentive, and recol-

lective), has always been recognized as of value to student, teacher, and practitioner.

For some years past it has been my custom to arrange the components of the female pelvis (anatomical, functional, and pathological), in natural groups of "threes"—*Tripartition*, as illustrated by the following specimen charts, subject to change and further elaboration.

Anatomically the pelvis may be looked upon as a cavity:

1. Bounded circumferentially by a bony wall.
2. Roofed over by peritoneum, and
3. Closed below by the pelvic floor.

This bony basin, or bird's nest, is formed by the union of the two ossa innominata (originally, os pubis, ischium, and ilium) and the sacrum, united at

1. The sacro-iliac synchondrosis, and
2. The pubic arch, by the corresponding ligaments, and by
3. The sacro-sciatic ligaments (greater and lesser).

The superior boundary (1) of this basin is designated as its brim or inlet, the inferior portion (2) as the outlet, and the interior (3) lying between inlet and outlet, as its cavity.

The pelvis is roofed over by peritoneum, which enfolds the superior portions of the pelvic organs and separates them from (1) the peritoneal cavity, (2) the intestines, and (3) the omentum.

As the peritoneum dips down to conform to the pelvic organs, it forms double layers, denominated ligaments, viz.: (1) the uterovesical, (2) the broad, and (3) the uterosacral ligaments. The depressions lying between these ligaments and the respective organs are known as (1) the anterior or uterovesical pouch, (2) the lateral, and (3) the posterior pouch, or *cul-de-sac*, of Douglas.

1. *The Pelvic Contents.*—The pelvis is found to contain three tracts, or channels, each endowed with special functions; each subdividing and subject to changes in size, shape, and consistence necessary for the fulfillment thereof. These tracts, independent, yet wonderfully interdependent; corre-

lated; acting each for itself, yet every action affecting its neighbors for good or evil; working together the one with the other, in such intimate relationship as to require the most thorough knowledge of their anatomy, functions, and pathology to determine (1) which is the sufferer, (2) which is at fault, and (3) toward which we must direct our therapeutic efforts.

The pelvic floor, or diaphragm, is made up of:

			Functions:
1. Skin.			
2. Muscles.	1. Vulvovestibular group.	1. Erector clitoridis.	1. Constrictor vagina.
		2. Musc. bulbi cavernosi.	2. Control anus and childbirth.
		3. Constrictor vagina.	3. Support pelvic and abdominal viscera.
	2. Transvers perinei.		
	3. Anal group.	1. Levator ani.	
		2. Sphincter ani.	
		3. Coccygeus.	
3. Fascia.	1. Superficial fascia, superficial layer.		
	2. Superficial fascia, deep layer.		
	3. Triangular ligament.		

Externally the pelvic floor presents

1. VULVA.	1. Labia majora.	1. Clitoris.	
		2. Bulbi vaginæ.	
		3. Bartholinian glands.	
	2. Labia minora.		
	3. Vestibule.	1. Meatus urethræ.	
		2. Skene's ducts.	
		3. Hymen.	
2. PERINEUM—Median rhaphe.			
3. Ischio-anal region.	1. Anus.		
	2. Ischiorectal fossa.		
	3. Coccyx.		

1. URINARY TRACT—Canals. Inlet or outlet or both.
   1. Ureters. Pelvis of kidney—Ostium of ureter opening into:
   2. Bladder. Meatus internus opening into:
   3. Urethra. Meatus urethræ externus.

Functions.—1. Conduct. 2. Collect. 3. Expel urine.

2. GENITAL TRACT.—1. Vagina, hymen—Os externum uteri.

Functions.—1. Coition. 2. Uterine discharge. 3. Birth canal.

2. Uterus—Os externum uteri—os tubæ.

Functions.—1. Menstruation. 2. Gestation. 3. Expulsion of fetus.

3. Fallopian tube—Os tubæ—os fimbriæ.

Functions.—Conduct (1) sperm, (2) ovule, (3) ovum.

3. ALIMENTARY TRACT.—1. Peritoneal portion.

Functions.—Collect solids. 2. Conduct fluids. 3. Expel gas.

The general anomalies of the pelvis can be best grouped under the following headings:

1. Deformities (congenital).	1. Non-formation—absence of.			
	2. Arrested growth—immature.			
	3. Asymmetrical growth.			
2. Distortions.	1. Size.	1. Length.	2. Breadth.	3. Thickness.
	2. Shape.	1. Axial.	2. Caliber.	3. Diameter.
	3. Continuity.	1. Functional.	2. Traumatic.	3. Operative.
3. Distention (contents).	1. Fluids.	1. Blood.	2. Serum.	3. Pus.
	2. Solids.	1. Foreign bodies.	2. Neoplasms.	
	3. Mixed.			
4. Dislocations (displacements).	1. Position.	1. Upward.	2. Downward.	3. Lateral.
	2. Direction.	4. Right.	5. Left.	6. Backward.
	3. Mobility.	1. Immobile (fixation).	2. Limited (partial).	3. Excessive.
5. Disorders.	1. Function.	1. Absent.	2. Suspended.	3. Abnormal.
	2. Secretion.	1. Suppressed.	2. Diminished.	3. Excessive.
	3. Sensation.	1. Insensitive.	2. Sensitive.	3. Supersensitive.
6. Diseases.	1. Infectious.	1. Syphilitic.	2. Tuberculous.	3. Pyogenic.
	2. Structural.	1. Mucous membrane.	2. Muscle.	3. Peritoneum.
	3. Neoplastic.	1. Benign.	2. Malignant.	3. Mixed.

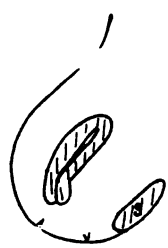
From the study of the development of the genital tract we learn that *Congenital Deformities* may be classified as:

1. Non-development—Uterus, vagina, tubes, one or all absent.
2. Rudimentary development.
3. Incomplete, asymmetrical growth, as:
   1. Uterus unicornis—unilateral development of Müller's ducts.
   2. Uterus bipartitus—non-development of horns.
   3. Uterus duplex.
      1. Didelphys, non-union of Müller's ducts.
      2. Bicornis, partial non-union of Müller's ducts, no fundus.
      3. Septus, union of Müller's ducts, septum persists.

Atresia—non-perforation.

1. Atresia hymenalis—inflammatory adhesion after nineteenth week.
2. Atresia vaginalis.
   1. Upper and middle third.
   2. Lower third.
   3. Transverse septa, any portion of the canal.
3. Atresia cervix—os ext. or int. (usually acquired).

2. *Uterine Distortions.*—When the uterus lies in the axis of the inlet, the bladder being partially distended, if a straight stiff wire were introduced at the umbilicus and forced downward and backward so as to emerge at the tip of the coccyx, during its passage through the pelvis it will have pierced the fundus uteri, passed through the uterine cavity and cervical canal, and represent the so-called axis of the uterine canal.



[1] FIG. 1.—Anteflexed cervix lying over anus.

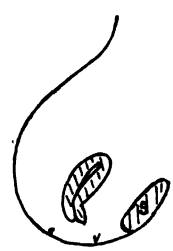


FIG. 2.—Anteflexed cervix lying over perineum.

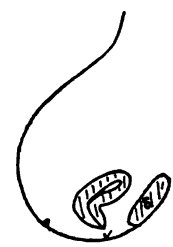


FIG. 3.—Anteflexed cervix lying over vulva.

Under one or more of several influences, the cervix or the body may deviate from this line, producing a more or less acute anterior or posterior angle at the junction of the corpus and cervix uteri. Such angulations are designated *flexions.* Most teachers and text-books describe these torsions, with-

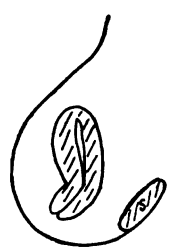


FIG. 4.—Retroflexion, fundus below promontory.

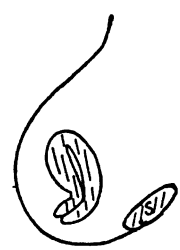


FIG. 5.—Retroflexion, fundus in pelvic hollow.

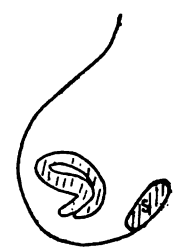


FIG. 6.—Retroflexion, fundus on pelvic floor.

out particularizing which portion of the organ has been the factor in making the angulation. In practice we find that it is either the cervix bent forward—anteflexion of the cervix—or the fundus and body bent backward—retroflexion of the fundus. This claim can be readily substantiated, as in anteflexion of the cervix the fundus is directed upward and for-

[1] Cuts kindly loaned by the *New York Medical Journal.*

ward, in contact with the bladder—its normal relation—while the cervix instead of lying high up, almost out of reach, in the vagina, has approached the os vaginæ, in direct proportion to the degree of flexion (Figs. 1, 2, 3). On the other hand, when the fundus is flexed backward, we find the cervix high up in the posterior fornix and the fundus dislodged to a greater or less degree below the promontory (Figs. 4, 5, 6). It is, therefore, our practice to designate the position of the uterus in the pelvis and the degrees of angulation in the following way:

Uterine Distortions. 1. *Anteflexion of the Cervix.*—First degree, os externum over anus; finger must be inserted

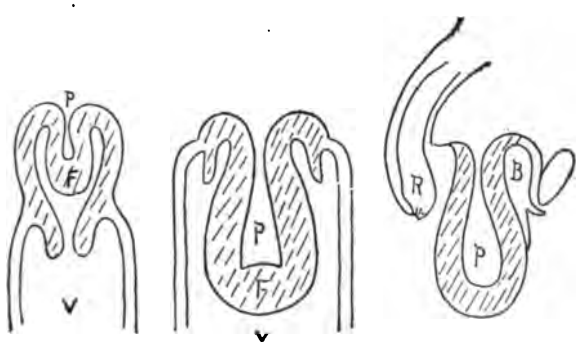


FIG. 7.—Inversion of fundus into uterine cavity. FIG. 8.—Inversion of body into vagina. FIG. 9.—Inversion of uterus through vulva.

within hymen to third finger-joint, or about three inches (Fig. 1). Second degree, os externum over perineum; finger to second joint, about two inches (Fig. 2). Third degree, os externum at vulva; finger to first joint, about one inch (Fig. 3).

2. *Retroflexion Fundus* (Figs. 4, 5, 6).—First degree, fundus lies below sacral promontory. Second degree, fundus lying in sacral hollow. Third degree, fundus lying on pelvic floor, "U" shaped (rare).

3. *Inversion* (Figs. 7, 8, 9).—First degree, fundus inverted into uterine cavity. Second degree, fundus inverted into vagina. Third degree, fundus projects through the vulva.

3. *Distention* of the genital tract arises from:

1. Tubal.	1. Hydrosalpinx.	2. Hematosalpinx (tubal gestation).	3. Pyosalpinx.
2. Uterine and	1. Hematocolpos. 1. Polypi.	2. Hematometra.	3. Pyametra.
3. Vaginal.	1. Fibrosarcoma.	2. Fibroids. 2. Sarcoma.	3. Fibrocysts. 3. Epithelioma, etc.

4. *Dislocation or Displacement.*—From the triple standpoint of (1) frequency; (2) the suffering incident thereto, and (3) the almost insurmountable difficulties to be overcome in restoring and retaining them, displacements of the pelvic viscera, from whatever cause, have furnished the gynecologist with matter for serious thought and problems as yet unsolved.

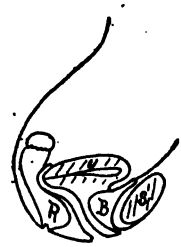


FIG. 10.—Uterus overlying bladder, vagina, and rectum.

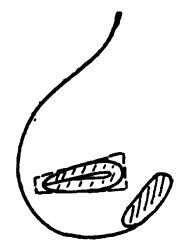


FIG. 11.—Uterus bridging over vulvar outlet.

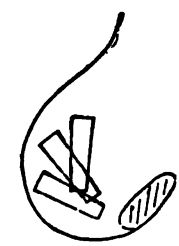


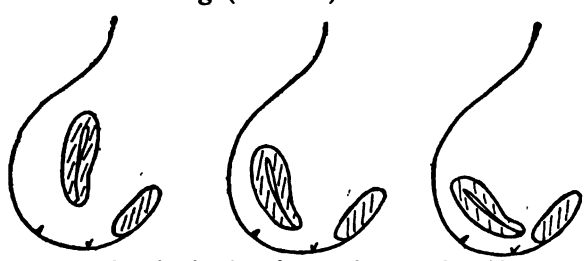
FIG. 12.—Uterus as a wedge sliding down pelvic floor.

The Position of the Uterus.—The uterus may be looked upon as a wedge-shaped *beam*, suspended within the pelvis, at a more or less acute angle, horizontally, by a hammock-like series of guy-ropes (ligaments) fore and aft, to larboard and starboard, made fast at the junction of its middle and lower third, heaviest end up—top-heavy—naturally it tends to dip forward and downward until it rests upon a soft water-bag (bladder), firmly attached to and supported by the bony framework (symphysis pubis), and below this point it can not go. Its lower, lighter, posterior end, the cervix, lies above the rectum, vagina, and coccygeal portion of the perineal floor (Fig. 10). The beam (uterus) thus bridges over the pelvic outlet, and *unless the beam swings backward or bends, or the support (pelvic floor)* gives way or breaks, no amount of force from above can dislodge it (Figs. 11, 12).

Uterine Mobility.—Normally the hammock-like ligamentary attachments of the uterus and adjacent structures permit of a wide range of mobility in every direction; rising and falling with every respiration, receding and advancing in unison with vesicle systole and diastole, etc.

Abnormal mobility of any of the pelvic contents must be said to be present when any portion of the three tracts *has suffered such a degree of dislocation as prevent it from resuming and maintaining its normal position and relations*, usually denominated *displacements*.

Uterine displacements, represented by the swinging of the beam, without bending (version) so far backward that the



FIGS 13, 14, and 15, showing three degrees of retroversion with prolapse.

natural elasticity of the guy-ropes (ligaments) will not suffice to restore it to its proper resting place upon the fundus of the bladder, are spoken of as *versions*.

As above noted, the fundus uteri normally rests upon the fundus vesicæ when that organ is empty, the latter being closely attached to the symphysis pubis, making that bone the real support of the fundus uteri and pathological *anteversion* a practical impossibility. Therefore as deviations from the normal *position* in the pelvis we have:

1. UTERINE.—1. Retroversion (Figs. 13, 14, 15).
   - 1st degree. Fundus below promontory; os externum over anus,[1] third joint.
   - 2d degree. Fundus in pelvic hollow; os externum over perineum, second joint.

[1] When the cervix uteri is in its normal position the examining finger can not be introduced far enough to reach the os externum, but comes in contact with the anterior lip. If (1) the fundus is pushed backward, if (2) the uterus lies in retroversion, or if (3) the cervix is anteflexed, the examining finger readily comes in contact with the external os. This fact has been taken advantage of as a means of designating the position of the cervix and its deviation from the normal, as determined by the distance which the finger must be introduced within the hymen to reach the os externum, and expressed as "finger inserted to the first, second, or third joint," or a corresponding number of inches.

3d degree. Fundus on pelvic floor; os externum opposite os vaginæ, first joint.

2. Lateroversion. 1. Right. 2. Left. 3. Oblique.

3. Descensus. Internal. 1. Fundus below promontory (Figs. 4, 13).

(Intravaginal) 2. Fundus in pelvic hollow (Figs. 5, 14).

3. Fundus on pelvic floor (Figs. 6, 15).

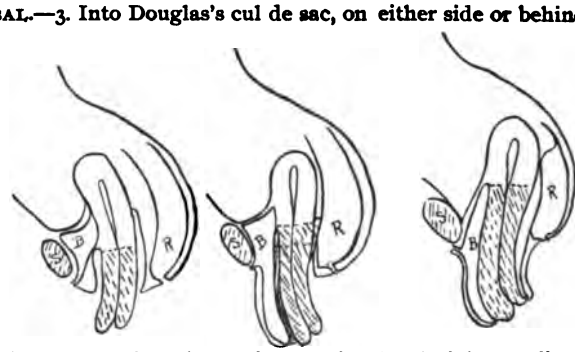
External 1st degree. Cervix projects through os vaginæ.

(Extravaginal) 2d degree. Partial extrusion of body of uterus with bladder.

3d degree. Complete extrusion body of uterus with bladder and rectum.

2. VAGINAL.—1. Urethrovaginal, or urethrocele,
2. Vesovaginal, or vesicocele,
3. Rectovaginal, or rectocele,
} āā 1 degree, 2 degrees, 3 degrees.

3. OVARIAN and TUBAL.—1. Into anterior pouch or shelf (in front of fundus uteri).
2. Into lateral pouch or shelf.
3. Into Douglas's cul de sac, on either side or behind cervix.



FIGS. 16, 17, and 18, showing hypertrophy of vaginal, intermediate, and supravaginal portions of the cervix.

Descensus Uteri (Prolapsus, procidentia, hernia, enterocele uteri). Whenever we meet with (1) relaxation of the pelvic floor, (2) backward dislocation (retroversion) of the uterus, or (3) anteflexion of the cervix, we also find as a part of the same process the uterus sliding down the sacral curve (pelvic toboggan) at a speed limited only by the superincumbent weight, intra-abdominal tension, tumors, etc., which will eventually force it, with the bladder and rectum, entirely outside the vagina. The degrees of prolapse are most lucidly described as internal or intrapelvic, and external, when projecting through the os vaginæ (supra).

An Hypertrophied Cervix Uteri projecting from the vulva may be mistaken for an external prolapsus uteri, but presents the following distinctive features (Hart, Barbour):

1. Of the vaginal portion—both fornices persist in their normal position (Fig. 16).

2. Of the intermediate portion—the posterior fornix remains (Fig. 17).

3. Of the supravaginal portion—both anterior and posterior fornices are obliterated (Fig. 18).

Functional disorders may be illustrated in tabular form by enumerating the *Disorders of Menstruation*:

1. Period (type).	1. Absent (suspended).	2. Lengthened (infrequent).	3. Shortened (too frequent).	
2. Duration (days).	1. Lessened.	2. Increased.	3. Off and on.	
3. Quantity.	1. Diminished (scanty).	2. Increased.	3. Excessive.	
4. Quality.	1. Clotted.	2. Black.	3. Serosanguineous.	
5. Pain.	1. Time.	1. Before.	2. During.	3. After.
	2. Location.	1. Abdomen.	2. Sacrum.	3. Pelvis and thighs.
	3. Nature.	1. Cramp-like	2. Bearing-down.	3. Continuous.
6. Reflexes.	1. Headache.	1. Occipital.	2. Vertex.	3. Frontal.
	2. Stomach.	1. Nausea.	2. Vomiting.	3. Indigestion.
	3. Bowels.	1. Diarrhea.	2. Constipation.	3. Obstipation.
	4. Bladder.	1. Anuria.	2. Polyuria.	3. Dysuria.
	5. Breasts.	1. Hardened, erect—congested.		
		2. Sensitive—tender—painful.		
		3. Secreting.		
	6. Veins.	1. Vulva.	2. Extremities.	3. Pelvis.
		1. Congested.	2. Dilated.	3. Varicose.

MALE TRACT contributes:	FEMALE TRACT contributes:		
1. Testicle—spermatozoa.			
2. Spermatic and urethral canal.			
3. Prostate gland.	Penis—Coition—vagina—uterus, Fallopian tube.		
	1. Semen.	2. Ovule. 3. Ovum.	Ovary.
1. Implantation.		2. Gestation.	3. Parturition.

Disorders of Fetation:

1 Sterility.	1. Masculine.	2. Feminine.	3. Both.	
2. Gestation.	1. Abortion.	2. Miscarriage.	3. Premature birth.	
3. Parturition.	1. Precipitate.	2. Difficult.	3. Operative.	
Dependent on the relation of passage, passenger, and powers.				
Primarily,	1. Urethra,	Secondarily. 1. Trigonum.	2. Ureters.	3. Kidneys.
	2. Vagina.	1. Skene's ducts.	2. Cervix.	3. Uterus.
	3. Rectum.	1. Bartholin's ducts.	2. Tubes.	3. Peritoneum.
Sources.	1. Birth canal. 2. Manipulation. 3. Coition.			
Habitat.	Mucous membrane, preferably columnar epithelium. Serous membrane, less so (squamous epithelium).			
Course.	1. Incubation (1 to 7 days).	2. Invasion–acute.	3. Course–chronic.	
Symptoms.	1. Pain (local).	2. Congestion.	3. Discharge.	
Diagnosis.	1. Traumatic.	2. Senile.	3. Neoplastic.	
	1. History.	2. Gonococcus.	3. Inspection.	
Treatment.	1. Local (1) silver nitrate.	2. Ichthyol.	3. Douches.	
	2. General (1) heat.	2. Cold.	3. Sedatives.	
	1. Nourishment.	2. Urine.	2. Bowels.	
	3. Operative. Excision.	1. Skene's ducts.	2. Bartholin's ducts.	3. Pyosalpinx.

The disorders of reproduction involve as careful consideration of the male as of the female organs.

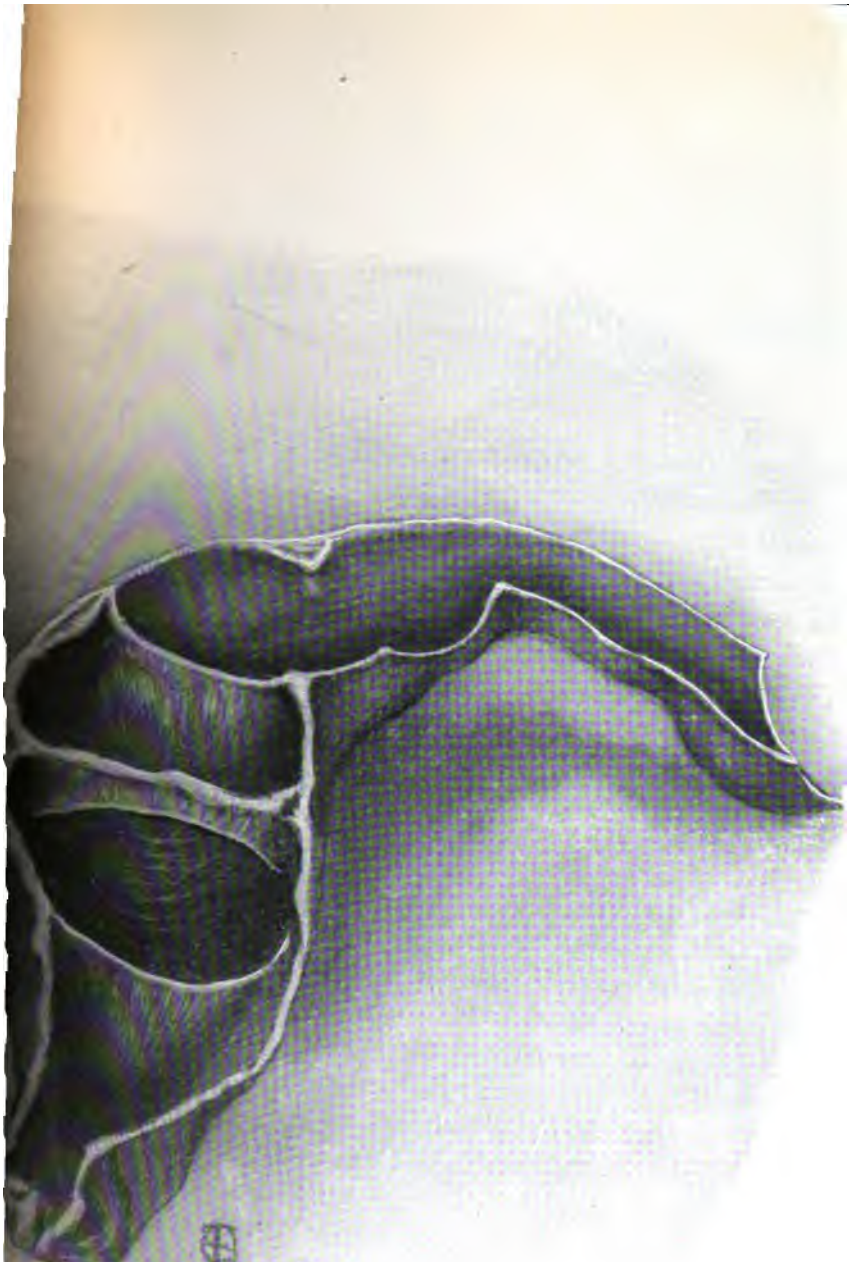
Infectious Pelvic Diseases.—1. Gonorrhea.

Nature.—A specific inflammation due to the presence of the gonococcus (diplococcus) of Neisser.

Etiology.—Age, birth to old age. Sex, both; most common during sexual activity.

In conclusion: It is hoped that the foregoing outlines will be the means of stimulating teachers to greater activity in systematizing their subjects (1) as conducive to consecutiveness, conciseness, and clearness; (2) as an aid to the student in comprehending, noting, and fixing, and (3) as a means of simplifying its application to the living patient.

FIGURE ILLUSTRATING ARTICLE BY



R THOMAS CHARLES MARTIN.

XXXV. CONGENITAL VALVULAR OBSTIPATION.

By THOS. CHAS. MARTIN, M. D.,
Cleveland, O.

The specimen which I exhibit consists of a rectum taken post-mortem from a subject previously unknown to me. The history of the case can not be related. The subject was a woman, apparently between fifty and sixty years of age. On opening the abdomen it was discovered that there had been a general peritonitis. Search revealed two perforations in the middle part of the lower loop of the sigmoid flexure. In various places in this portion were found areas superficially necrosed. The sigmoid flexure was dilated and its walls hypertrophied. The bowel was washed out and ligated at the sigmoido rectal juncture. The cadaver was inverted, the anus opened, and the rectum poured full of melted paraffin. When this was sufficiently hardened the paraffin-cast-filled rectum was dissected out. After two weeks' immersion in alcohol it was varnished and dried. Over its convex posterior surface it measures 7½ inches. Its greatest transverse diameter is three inches. Its upper half is more contracted than is usual for this portion of the gut. As you see, it is divided longitudinally into halves. By virtue of the method of preparation the walls are fixed at the greatest expansion of the organ. Examination of its interior discloses that this rectum is occupied by four considerably developed valves. The second and third valves are abnormally deep. The second, the one which is on the right side, measures 1½ inches from its free to its attached border; the third is 1¼ inches in depth; the sum of the depth of these two valves is 2¾ inches, while the transverse diameter of the rectum itself at a point occupied by these two valves is scarcely 2½ inches. These two valves are situated vertically,

within half an inch of one another. It is apparent that, because of the extreme depth of these valves and their proximity to one another, their free edges overlapped and established a temporary diaphragm, which must have obstructed the descent of feces through this portion of rectum. By inspection of the specimen it may be discovered that the second valve so far trespasses upon the left half of the rectum that, on longitudinal division of the rectum into equilateral halves, a portion of this valve remains as a bridge suspended across the half opposite its base. Save for the congenital malformations, namely, the overgrowth and the propinquity of the valves, and the noticeably contracted upper portion of the rectum, this organ itself does not appear to be otherwise abnormal. In cases of valvular obstruction not unusually it is observed that there is dilatation of that portion of the rectum immediately above the obstruction. Such dilatation was probably prevented in this case by the arrangement of the peritoneum, which did not form a mesentery, but on the contrary bound the rectum securely to the sacrum. That portion of the bowel above this bone was provided with a mesentery and was dilated. The sequence which led to catastrophy in this case, obviously, was the usual one: Obstruction, dilatation, inflammation, ulceration, perforation, general peritonitis, and death.

CASE I.—The patient was a woman, seventy-three years of age, whom I was requested to see with Dr. W. H. M. From infancy she had experienced difficult defecation, which gradually developed into a chronic struggle with obstipation, and which for many years was only occasionally interrupted by diarrhea. Cathartics and enemata had been employed throughout her long life with more or less irregularity. The patient stated that she would regularly have used such means if she had not been taught to believe that nature would take care of herself. She was confined to her bed, was much prostrated, having been subject to a constant diarrhea for the preceding five or six months. During this period she constantly had a temperature varying from 99° to 101° F. She complained of pain in the region of the splenic

flexure of the colon. Examination of the abdomen revealed masses of feces in the sigmoid flexure and descending colon. The tenderness was greater in the region of the splenic flexure. A mass was discernible here, which was, however, not so large as the others, and was not movable. Nothing significant was discovered in the dejecta. The diagnosis at this time was held to be conjectural, the surmise tending toward tuberculous or malignant disease of the intestine. A nitrogenous diet and colonic flushings were administered, and after a few weeks the patient's general condition was somewhat improved; there were no masses to be found in the abdomen, but the diarrhea continued. She was proctoscoped, and a rectum similar to the one exhibited was disclosed. Without the use of any anesthetic, with the infliction of but slight discomfort and some slight degree of fatigue, the most obstructing rectal valve was divided. The valvotomy was done in September of 1900. Subsequently the patient's diarrhea gradually was arrested, obstipation did not recur, the temperature became normal, and during the past sixteen months the patient's condition has grown relatively robust. Defecation has been normal for the first time in her seventy-three years.

CASE II.—June 3, 1898, a woman, thirty-two years of age, the daughter of the subject of the previous report, consulted me for the relief of obstipation. She reported that ever since she could remember defecation was possible and easy only when the feces were rendered fluid by means of cathartics or enemata, that when the feces were formed their evacuation was accomplished only with the greatest straining and by manual assistance. The young woman was profoundly neurasthenic and suffered from repeated attacks of intestinal self-intoxication. Proctoscopy disclosed a general hypertrophic proctitis and such a degree of hypertrophy of the rectal valves and contraction of the valve-strait as is equivalent to multiple annular stricture. The valves were situated in such propinquity as to overlap. Without the employment of general anesthesia the valves were divided. The operation was painless. Normal defecation was restored and continued.

CASE III.—In October, 1898, Mrs. C., thirty-four years of age, the mother of two children, consulted me for the relief of persistent obstipation and annoying borborygmus. She was emaciated, neurotic, and irascible to the last degree. She reported that since childhood she had been the subject of difficult defecation. The rectum was evacuated only occasionally, and within the last few years she had suffered

recurrent attacks of diarrhea. Proctoscopy revealed the two lowermost rectal valves slightly hypertrophied and the presence of two much-hypertrophied rectal valves at the juncture of the sigmoid flexure. These two higher valves overlapped. The sigmoid was observed to be much dilated. All the valves were divided. Normal defecation was established.

CASE IV.—In June, 1898, Mrs. R. B., aged thirty-six years, the mother of three children, came to me for relief of obstipation and continued pain in the iliac fossæ. She reported that from childhood she had never had an evacuation of the bowels except when the feces were fluid and had been rendered so by cathartics. She was addicted to the physic habit, was neurasthenic, suffered repeated attacks of intestinal self-intoxication and recurrent attacks of proctosigmoiditis. Proctoscopy disclosed four hypertrophied rectal valves, two of which overlapped. An operation for the division of the valves was performed. Without the aid of enemata or cathartics, normal defecation was almost immediately established, and firmly formed feces were evacuated, with little or no straining, once in two or three days, and, finally, daily with only an occasional intermission. However, the patient was many months recovering from the intestinal self-intoxication incident to the dilated sigmoid.

CASE V.—Miss G. H., aged nineteen years, was referred by Dr. C. F. H. From infancy she had suffered more or less chronic irregularity in defecation. This difficulty had increased to such a degree during the last two years that cathartics and enemata were indispensable. She reported the classic symptoms of intestinal self-intoxication. An examination by means of the proctoscope revealed the presence of four rectal valves and the fact that the first two were anatomically coarcted. On April 29, 1900, valvotomy of the two first valves was done. She was immediately relieved of the obstipation, the function of defecation has since been perfectly normal, and her neurasthenic symptoms have entirely subsided.

CASE VI.—A girl, ten years of age, suffering from congenital valvular obstipation, was referred to me by Dr. J. and Dr. R. The history in brief is as follows: Defecation unaided never has been possible except during certain short periods following rectal divulsion. When she was two years old the rectum was subjected to forcible dilatation by means of a two-blade speculum, and for a few weeks the function was practically normal, but the difficulty soon recurred. Within a year or so the operation was repeated with like

result. Two or three years later a repetition of the operation proved ineffectual. Defecation, with the exception of the two periods referred to, was never possible unless the feces were reduced to a liquid consistence. This was accomplished by the use of enemata and purgations. These means were losing their efficacy. I was consulted in September of 1900. The patient ere this had developed marked evidences of intestinal self-intoxication. Proctoscopy revealed the presence of four rectal valves. The two lower (right and left) ones were situated within half an inch of one another and each projected more than half across the rectum, which, when inflated, was about 2½ inches in diameter. This organ had a vertical diameter of 4½ inches. These two valves were not much hypertrophied, but were obstructive by reason of the temporary diaphragm which they formed by overlapping. The child was extremely nervous and emotional and should have been anesthetized for this reason, but on account of hay-fever, from which she was suffering, anesthesia was deemed inadvisable. One who has had experience with the use of the proctoscope must have observed the rise and fall of the anterior wall of the ballooned rectum with each respiration in some subjects, and will understand the difficulties encountered in the operation on a crying child. On the second day after the operation the child swallowed a checker piece; on the next day it was passed with ease. Normal defecation was established and continued for a little more than two months. Symptoms of rectal obstruction then again gradually developed. When the hay-fever had subsided the little patient was anesthetized and a thorough division of both overlapping valves was made. This operation was followed by daily normal defecation. A few weeks later the child swallowed a tin whistle. It was never heard from. It is now more than sixteen months since this little patient was operated on; the function of defecation is perfectly normal.

Congenital valvular obstipation is by no means uncommon. In one hundred and seventy-two cases of obstipation I have encountered but twenty-two typical cases in adults. However, the majority of my cases not so recorded have in their history and proctoscopic appearance that which signifies the previous existence of this condition, and it is this element which has predisposed to an acquired hypertrophy of the valves. For instance, let us recognize that the condi-

tion is an overlapping of two rectal valves. These valves are attached on opposite sides and are, in a vertical direction, but an eighth of an inch apart at their bases. Their free edges, being movable, are thrown in contact and thus form a barrier to the descent of the feces. This illustration, be it understood, is the case of a child four years old, whose rectum is four inches in length and two inches in transverse diameter. When adolescence is attained the rectum has been about doubled in length and breadth, and at this period in such a case the valves' bases may be separated by half an inch in the vertical direction and their free edges separated by an inch or two. Thus may a subject outgrow congenital valvular obstipation, yet by reason of their propinquity he may more readily acquire an obstructive degree of valve hypertrophy than another. This fact has been so frequently observed that one experienced in proctoscopy can, without any hint whatever, tell a patient after an examination of his rectum whether or not he, as a child, suffered from difficult defecation.

XXXVI. THE USE AND LIMITATIONS OF THE ELASTIC LIGATURE IN INTESTINAL SURGERY.

By THEODORE A. McGRAW, M. D.,
Detroit, Mich.

If we study the literature of intestinal anastomosis we shall find that of the numberless methods devised for its production only two have thus far continued in favor with the profession. A surgeon who has no method of his own devising will almost invariably resort either to incision and suture or to the Murphy button. Both of these methods of operating, however, have defects which every now and then lead to disaster and death. In both, the cuts in the intestine cause more or less hemorrhage, when even a slight loss of blood is illy borne by many of the anemic patients upon

whom we have to operate. In both there is danger of infection arising from the escape of intestinal contents from the opened bowels. In both, there have at times been failures in union and deaths from general peritonitis.

Incision and suture, if carefully done, takes a great deal of time—a fault which, in very exhausted patients, may make the difference between life and death. The Murphy button can be more speedily applied than the suture, but has some disadvantages which the suture has not. In the first place, the size of the opening must be limited to that of the button, a very decided disadvantage when a large, permanent fistula is indicated. Then its lumen may be occluded by seeds or fecal concretions. When the bowel below a chronic obstruction has become, as I have often seen it, small, thin, and contracted, it is sometimes extremely difficult to get a button in at all without tearing the bowel. In some cases the button has remained permanently in the stomach or duodenum. In all, it is a large foreign body which must find its way through a long, small intestine with a possibility of causing irritation or obstruction.

It is because those methods are not, in all respects, satisfactory, that I wish to urge again upon the profession the use, in certain classes of cases, of the elastic ligature. I first introduced this method of making an anastomosis in a paper read before the American Medical Association in May, 1891. I shortly afterward became acquainted with the Murphy button, and abandoned my own method in its favor. The chief reason which actuated me in giving it up then, and which now makes surgeons reluctant to adopt the method by the ligature is, I am now convinced, founded upon a false pathology.

It seemed to me then that a method which made an immediate communication between the two viscera and permitted without any delay the passage of food, must be superior to one in which the opening was delayed for three or four days. I assumed that such patients could immediately

get some nutriment into the bowel through the new channel. I left entirely out of my reckoning those pathological conditions which interfere with the motility and function of a bowel for many hours, or even days, after it has been infused. Long years of observation of patients after laparotomies have brought me to the conclusion that in most cases the stomach and intestines are not able to avail themselves of the new channel until after the lapse of two or three days, even when the course of the wound is perfectly aseptic.

The anesthetic produces in most patients a gastric irritability which lasts many hours. Besides that, the injury done by the operation itself inhibits for an indefinite time the muscular contractions of the gut and with it the digestion and absorption of food. Even the troublesome vomiting after laparotomies may not be due to any gastric activity, for there is reason to believe that the diaphragm and abdominal muscles are the only muscles concerned in its production.

Only in this way can we explain the vomiting which occurs sometimes when a "vicious circle" has formed after a gastro-enterostomy, for if the muscles of the stomach were acting upon the newly formed fistula they would draw its edges apart and thus empty the contents of the stomach into the intestine, whereas a convulsive movement of the diaphragm and muscles of the abdomen forces them out through the esophagus. It is a well-known physiological fact, too, that dogs in which the stomach has been removed and a bladder inserted in its stead can nevertheless be made to vomit by stimulating those muscles into activity. It is rarely the case that gas begins to roll in the bowels before the end of the second day, and often the period of absolute quiescence lasts four or five days. We may safely assume that during this period all physiological processes concerned in the digestion of food are partially, if not completely, suspended. For this reason the belief that an immediate anastomosis has any advantages over one which ensues three or four days after the operation is a delusion. Indeed,

where the stomach is the subject of operation, it is highly probable that more nutriment will be absorbed from high enemata than from any food which can be introduced into the upper bowels.

Besides this theoretical objection which some surgeons have to the use of the elastic ligature, others are deterred by the feeling, expressed to me by a distinguished surgeon, as follows: "I like to see the opening into the bowels myself." There is a fear that the ligature will not certainly accomplish its work. This fear is absolutely without foundation if the operation is properly performed. In a large number of operations on dogs, in which the intestine is much thicker than in man, I have never yet met with a failure. Now, while the supposed disadvantages of the ligature are illusory, its advantages are very positive and definite. It is the quickest of all operations for the production of intestinal anastomosis.

A few Lembert stitches, the passage of the ligature through the adjacent viscera, the tying of a knot, a few more Lembert stitches, and the operation on the intestine is com pleted. There is no incision of the bowel, no loss of blood, no escape of feces, and no exposure to peritoneal infection from the bowel contents. The operation is followed by a minimum of shock and pain, and at the end of three or four days there is an anastomosis with a union by first intention. The bowel does not slough under the ligature but undergoes a process of absorption, and when examined at the end of three or four days the edges of the orifices are found closely united, without any raw surface whatever. There is, too, the enormous advantage of this method over the button, that the surgeon can govern exactly the length of the opening and make it large or small as may seem best.

Simple as this operation is, its success will, nevertheless, depend upon the observance of certain positive rules in its application. First of all is the choice of a proper instrument. This must be a firm, hard, round rubber cord at least two

millimeters in diameter. This must be made of the very best quality of rubber. It willl not do to substitute for this a rubber thread or a flat band. Nelson, Baker & Co., of Detroit, have recently had moulds manufactured for the production of ligatures which taper at the end. This facilitates the insertion of the cord in the needle and enables the surgeon to draw it through a very small aperture without injuring the tissues.

The bowels to be connected must be brought in apposition and fastened together with a row of Lembert stitches. The cord must be then passed through first one and then the other bowel, always in the direction of the longitudinal axis, and drawn tightly together in a single knot. This knot is securely fastened by means of a stout silk thread, which is tied firmly around it. As the thread is tied while the rubber is on the stretch, it can not slip off the ends of the rubber when the rubber is relaxed. The ends of the rubber are cut short. An additional row of Lembert sutures buries it from sight and the intestines are returned into the abdomen.

Now, the cases in which this method is adapted are, first, all gastro-enterostomies. After meeting with two cases in succession of so-called "vicious circle" after gastro-enterostomy, in which the food passing through the artificial opening has persistently found its way into the duodenum instead of into the distal limb of the jejunum, I have come to the conclusion that Roux's method of combining with every gastro-enterostomy an entero-enterostomy between the two limbs of the jejunum is the only safe method. If this is done by incision and suture the surgeon has to make four incisions into the bowels and make two difficult sutures. An operation by this method takes a great deal of time and is exceedingly exhausting. If, on the other hand, he operates with the Murphy button, he may accomplish the purpose quicker but makes, nevertheless, the four incisions and leaves two large foreign bodies in the intestines. This more than doubles the danger which would arise from a single

anastomosis, as the wound of the entero-enterostomy has not only to get rid of its own button but must also suffer the passage through it of the button used in the gastro-enterostomy. The superiority of the elastic ligature over all other methods when an entero-enterostomy is added to a gastro-enterostomy can not be doubted by any one who has used the procedure. The quickness of its application, its freedom from danger of sepsis, and absence of all complications are in brilliant contrast to the defects of other methods. Wherever a gastro-enterostomy is required, the method is the best available, provided the surgeon does not wish to open the stomach. Even then it may seem best adapted to existing conditions. Thus Dr. Mixter, in a case of an ulcer of the stomach in which relief had been obtained by means of a gastro-enterostomy with a Murphy button, was obliged to operate a second time on account of the recurrence of pain and gastric irritation. On opening the stomach he found that the artificial opening had very nearly closed. He passed the elastic ligature through the same opening, closed the wound, and the patient recovered.

In gastro-enterostomy for chronic ulcer the objection which some surgeons feel toward the method on account of the delay in completing the anastomosis would have no weight. The open pylorus would permit the free passage of the ingesta as soon as the stomach had recovered its motility. In chronic ulcer, therefore, the question is not one of nutrition but of relief from the irritation caused by the long contact of food, by the friction produced by the churning of the food in the stomach and by the corroding effect of the acid, whose secretion is excited by the presence of the ingesta. The object of the operation, therefore, is to secure a quick evacuation of the stomach by making a new and free outlet for everything taken in. In stenosis of the duodenum, intestinal anastomoses, according to Kelling, are contra-indicated, for the reason that the presence of the food in the duodenum inhibits the contraction of the gastric muscles.

If, therefore, there should exist a stenosis of the duodenum at its junction with the jejunum and an anastomosis were to be made between the first division of the duodenum and the jejunum, the operation would fail to give relief. More or less of the food would pass into the duodenum beyond the anastomosis and fill it up. The stomach would no longer empty itself, and the obstruction therefore would continue. If in stenosis of the duodenum, therefore, the surgeon ventures upon the operation for anastomosis at all, he should make the junction as near as possible to the strictured portion, in order not to leave a blind end in the duodenum, which, filled with ingesta, would exercise this inhibiting influence on the stomach motility. It is better in these cases to relieve the obstruction by operations directly upon it.

In practical stenoses of the small intestines, other than the duodenum, we have conditions especially adapted to operation by the elastic ligature. In these cases, as a rule, the distress caused by the narrowing of the intestine does not interfere as seriously with the general nutrition as does a pyloric stenosis. When the ingesta are forced through the narrow opening there is usually terrific pain, but the food passes on nevertheless and is absorbed. For a day or two before operating on these cases purgatives should be given and all food withheld from the stomach. Nutrition may be kept up by nutritive enemata. If the obstruction is caused by cicatricial contraction, the needle and ligature may be passed into the intestine an inch or more from the point of obstruction and carried through the existing channel and out again through the other limb of the bowel. The ligature then doubles the gut upon itself and when it cuts through leaves an ample channel. Inoperable tumors of the gut demand the elimination of the diseased portion of the intestine from use by an anastomosis of the healthy bowel above and below the diseased point, where no obstruction has taken place. The elastic ligature is the very best instrument for its production. It may also be used when the obstruction is

only partial. In complete obstructions, from any cause whatever, which require an incision into the bowel for the evacuation of gas and feces, the anastomosis should be made by other methods.

Radical operations for the removal of cancers of the large intestine are exceedingly dangerous; even when determined on, however, they may be advantageously preceded by the formation of an anastomosis.

In so doing the ligature should be passed through one of the longitudinal bands, where the bowel is thickest. All operations of this kind are rendered more uncertain on the colon than on the small intestine by reason of the greater solidity of the feces. Lines of suture which will hold fast against any amount of liquid or semi-liquid substances may be torn apart if subjected to the pressure and friction of more solid masses. Kelling, in his experiments on sutures of the stomach, found them safe to resist the pressure of large amounts of fluid, but easily ruptured by hard ingesta. For this reason it is well in any operation on the large intestines to strengthen the line of union as much as possible by double or triple lines of Lembert sutures, and by wrapping the omentum around the wounded gut and securing it in place. The serous membrane, too, should be scratched in order to make its adhesion more certain. I have said that complete obstruction of the bowel can not be treated to advantage by the elastic suture. There is, however, an exception to this rule in those cases of acute obstruction in which the bowel has become gangrenous and in which excision of the mortified segment, with subsequent junction of the cut ends of the gut, seems inadvisable.

Extreme exhaustion of the patient is the cause, in most of these cases, which compels the surgeon to postpone the radical operation and to content himself with providing for the sloughing gut by fastening it outside of the abdominal wall. There may be also another reason for deferring excision when there is some uncertainty as to whether the bowel is

actually gangrenous, or, if so, as to the possible extent of the gangrene. Cases of this kind occur in strangulated hernia, in occlusion from bands of organized lymph, in volvulus and in intussusception. A good rule would be, in the treatment of these cases, where the strength of the patient is good and when the line of demarcation is sharply defined, to at once amputate the dead portion and to join the severed ends of the intestine with a Murphy button or by suture. When, however, the patient is on the verge of collapse, or when it is uncertain whether the coil of intestine is beyond recovery, or when there is no distinct line of demarcation to guide the surgeon to the proper point where an excision may be safely done, then another mode of procedure which will offer the patient a better hope of life is to be preferred. An anastomosis may be made by the elastic ligature in an evidently healthy part of the intestine. The abdominal cavity may be protected, as far as possible, from contamination by a packing of iodoform gauze, and the dead portion of the gut removed. The ends of the cut intestine, or the suspected coil, if its death is not certain, should be sutured to the abdominal walls. If a patient thus treated should happily recover, the progress of the case would be somewhat as follows: The exposed portion of the bowel would recover either without or with sloughing. If it did not die it could be gradually forced back into the abdominal cavity. If a fecal fistula formed, the feces would for a time pass out of the open end of the upper segment. The orifice of communication made by the ligature would, however, gradually become the main channel for the discharge of intestinal contents.

The cicatrization of the wound would tend to close the cut ends of the bowel and eventually lead to healing. If, however, they should not close, the wound could in time be re-opened and the simple operation of inversion and suturing the ends of the discharging bowel would be all that would be required to bring the case to a happy conclusion.

XXXVII. THE SURGICAL FEATURES OF TYPHOID FEVER AND DYSENTERY.

By HAL C. WYMAN, M.S., M. D.,
DETROIT, MICH.

Any surgeon who has operated for perforation of the intestine in a case of typhoid fever must have noticed that his results would have been very much better if he had operated earlier.

He must have thought that it would be better for the patient if there had been some way of knowing that perforation was imminent, so that an operation could have been done before the peritoneal cavity had been infected by the escaping contents of the intestine. This thought has led me to suggest that we should anticipate perforation and also intestinal hemorrhage in typhoid fever by a surgical operation, which promises to heal the ulcerated bowel before it perforates or bleeds.

I see no reason why we should not, in all cases of typhoid of a severe and threatening type, open the cecum near the ileo-cecal valve and establish a fistula through which a stomach-tube may be passed continuously into the ileum and the ulcerated region be daily washed with normal salt solution until it heals. And through it we may, by using this solution, wash out the colon and rid it of all infecting bacteria. Then, when the patient is convalescent, the fistula will close spontaneously. In case it should not, a few sutures would secure its closure.

It is probable that the large intestine is now of little use to man. It was undoubtedly the kitchen of primeval man. It macerated and cooked a large part of his cereals and performed a like office for the buds and leaves of his herbaceous diet.

Evolution has changed and is changing the diet of man, and he no longer needs to carry a cooking device about with him as a part of his body. His mastery of fire led him to use it in the preparation of his foods. In time his colon will disappear, as other unused organs are likely to disappear. But, in the meantime, it is a storehouse for divers bacteria inimical to man's health and happiness.

It is a fair presumption that the ileum in typhoid fever is infected by bacteria from the cecum and colon. The patency of the ileo-cecal valve insures regurgitation of the contents of colon and cecum into the ileum. The mucosa of the ileum—Peyer's patches—is, in autopsies of typhoid cases, commonly found ulcerated within a few feet of the ileo-cecal valve—about the distance traversed by the regurgitated fluids from the large bowel. Why not treat the disease radically by washing away the sources of infection? The surgery of typhoid perforation has not yielded the most satisfactory results, for the reason that the patient at the period of operation is likely to be greatly enfeebled, not only by the threatening peritonitis, but by the general distribution of the typhoid materies in many important organs. The operation here proposed anticipates all dangers from continued infection by seeking to remove the primary stores of typhoid organisms, and it diminishes the tendency to perforation by reducing the pressure and strain on the ulcerated parts.

It may not be always easy to select the cases most suitable for operation, and point out the ones that will terminate in hemorrhage, perforation, and death unless surgery is employed; but, if the physician has in mind the fact that about six per cent of all his cases are probably threatened in this way, he will readily select the case in which something out of routine drug treatment is indicated. Two patients have come under my observation on whom this operation was practiced. They were both characterized by profound constitutional disturbance and constant and inveterate tympany. The dejecta were of moderate frequency, and contained

blood, pus, and coagulation masses. In each case chloroform was used. The cecum was reached through an incision like that made in appendicitis. Sanious fluid was found in the abdomen and evacuated through the wound. A continued suture fastened a part of the cecum one inch and a quarter long and half an inch wide to the margins of the parietal peritoneum. Then the exposed cecum was incised. After large quantities of putrid intestinal gas and scybalous fecal fluids had escaped, a finger was introduced to guide a small stomach-tube through the ileo-cecal valve into the ileum, and the presumably ulcerated area was irrigated with a quart of normal salt solution. Copious gauze dressings were applied to the fistula; cotton and abdominal bandages covered them and kept them in place. They were changed about once in three hours, and three times every twenty-four hours the irrigation was repeated. The fever had existed in each case more than four weeks, and had shown no sign of abatement. There was no shock following the operation. Pulse and respiration improved directly and in one of the cases continued to improve uninterruptedly until in about a week convalescence was established. The fistula closed and was dry and sound five weeks after the operation. The other case was a man, aged 27, progressed steadily in other respects from bad to worse. He was at the time of operation extremely delirious and restless. His nervous symptoms were not materially modified by the treatment and he died three days after the operation apparently of the continued progress of the disease, as an examination after death showed a perfect union of the cecum to the abdominal wall, making sound and safe the fistula. There was a marked freedom from gaseous distention of the intestine, and no damage had been done the mucosa by the irrigation and drainage.

It is well known that dysentery, that scourge of the tropics, is characterized by divers grave lesions of the large intestine, presumably and demonstrably the result of bacte-

rial infection. Surgery has already been successful in the treatment of severe cases of this disease. The best method practiced is to make an opening in the cecum, establish a fistula and treat the ulcerated gut by daily irrigations of normal salt solution.

No doubt great good may come in cases of dysentery treated in this way, from the rest the large intestine gains by having the intestinal contents diverted through the fistulous opening. I would not think of performing this operation in any case of typhoid or dysentery that shows a reasonable tendency to recovery. Nor would I expect to cure all of the cases in which the tendency to hemorrhage and perforation was marked, because there are other causes of death that do not range within the therapeutic field of surgery.

But there is so little added danger when this operation is performed and the opportunity it gives to strike directly at the seat of the disease is so feasible that there is a distinct indication for it in all cases of either typhoid or dysentery which threaten to go from bad to worse.

In typhoid I would operate when there was present tympany, hemorrhagic or purulent stools, pain in abdomen, rapid, thready pulse, respiration above 30, provided of course these symptoms persist in spite of the use of sound internal treatment and diet. In dysentery I would operate when the patient's life is threatened in the second week of the disease by bloody stools and unyielding tenesmus.

Quantities of cleansing and nutrient materials may be given direct entrance to the system through this fistula at a time when they are most needed and with a force and value that need to be seen to be fully understood.

XXXVIII. SOME INDICATIONS FOR GASTRO-ENTEROSTOMY.

By WILLIAM J. MAYO, A. M., M. D.,
Rochester, Minn.

Gastro-enterostomy was first performed by Wolfler in 1881. The object was to relieve the stomach-dilatation caused by pyloric obstruction, without regard to the nature of the disease. The operation is one of such general application that it has steadily gained in popularity and is to-day of greater practical utility than all of the other operations on the stomach combined. Out of a total of 125 operations which we have made on the stomach, more than half have been gastro-enterostomies. In obstructive malignant disease it is a palliative of the greatest value, and in non-malignant obstruction the cure is definite.

Cancer of the Stomach.—In somewhat over one hundred cases of cancer of the stomach which the writer has examined with a view to surgical operation, more than half were so plainly advanced beyond radical intervention that exploration was not necessary to ascertain the fact. In spite of the most elaborate examination of the stomach contents and other methods of diagnosis, it has only been those cases in which mechanical features have been introduced by the location of the growth that a diagnosis could be made sufficiently early to enable an attempt at cure by a radical operation.

One of the most pronounced symptoms of gastric carcinoma is the diminished muscular power of the stomach, and if the growth be pyloric a small amount of obstruction gives early evidence of its presence. Adequate compensatory hypertrophy is not found, although present to a most marked degree in non-malignant obstruction. The great

difficulty in making an early diagnosis in malignant disease renders gastro-enterostomy the operation most often indicated. It is to be hoped that in the future an earlier diagnosis may more frequently enable radical operations to be performed. In forty-eight operated cases of cancer of the stomach we have made gastro-enterostomy sixteen times, with four deaths. The longest period of life after gastro-enterostomy was nineteen months, with ability to work until a few weeks prior to death. Excision of the pylorus and a greater or less amount of the stomach was undertaken but seven times, with one death; three are still alive, and one of these has lived nearly four years, although there are now beginning evidences of metastasis in the liver in this case. In the remaining cases, the extent of the disease or its location not giving rise to obstructive phenomena, operation was not indicated and the abdominal incision was closed. For five years we have sutured exploratory abdominal incisions for inoperable malignant diseases with permanent sutures of buried silk or silver wire. This enables the patient to get about the next day and leave the hospital within the week. If left in bed the usual length of time many of these patients become progressively weaker, and are unable to return to their home and friends. The mortality of gastro-enterostomy for malignant disease is 25 per cent. or over, fully as high as after pylorectomy. The first requirement for the performance of a radical operation is that the disease must not be too far advanced and the patient must be in good condition.

Gastro-enterostomy has no such limitations, and the mortality is influenced to a large extent by the condition of the patient.

Ulcer.—Excision or other form of surgical treatment is indicated in a few cases presenting special features, but the common situation of the ulceration, its varying extent, and the reasonable possibility that more than one ulcer exists, makes gastro-enterostomy the practical operation in the

majority of cases. Not infrequently the site of the ulcer can not be discovered, rendering gastro-enterostomy the operation of necessity.

The symptoms of ulcer of the stomach depend somewhat upon the situation of the disease. Ulcer is most common near the pylorus, a position which may introduce certain mechanical features, and it is in the relief of these secondary phenomena that this operation achieves its triumphs. Gastro-enterostomy relieves the hyperacidity and allows prompt emptying of the ingesta, preventing irritation and aiding nutrition.

The ulcerated stomach is often contracted, and among the earlier writers it was supposed to be always small; this is but part of the truth. In acute ulcer it is small, and if the ulcerative process is not in the vicinity of the outlet it will probably remain small. On the contrary, it is during the healing process that many ulcers in the pyloric region become most troublesome. Ulcers in this situation are often extensive and in chronic cases perhaps but partly cicatrized. Enough distortion or narrowing of the pyloric outlet takes place to materially obstruct the opening, the unhealed portion of the ulcer keeping up irregular symptoms of its presence in addition to the dilatation. In such cases symptoms of open ulcer alternate with periods of health, and later signs of ulcer in a stomach more or less dilated supervene.

The majority of cases when once cicatrized remain healed, but a minority occasionally lapse into open ulcer. The capacity of the stomach affected by ulcer is not greatly changed in the majority of cases, but if so it has a surgical significance. This gives us a good working basis of comparison. First, ulcers in the pyloric region with a normal or enlarged stomach, and second, ulcers in a contracted stomach.

As to the first group, gastro-enterostomy is the operation of choice. It delivers the ingesta at a point sufficiently far from the disease to prevent irritation, and the healing process is not interfered with and progresses rapidly. The relief

to the mechanical obstruction is immediate and satisfactory. We have made gastro-enterostomy nine times for this condition, with one death; the remaining eight were cured and remain well. At times a small ulcer at the pylorus causes pyloric spasm, and symptoms are produced resembling mechanical interference. In four cases of pyloric spasm we found dilatation only once, and then not at all marked. In this form of disease pyloroplasty is fairly effective but does not compare with the benefits derived from gastro-enterostomy in suitable cases, although the division of the pyloric sphincter stops the spasm and the enlargement of the opening exerts a healing influence on the ulcer.

Gastro-enterostomy on the small stomach affected by ulcer does not give immediate relief as a rule. In four cases of our own the symptoms in a modified degree continued for some months. However, experience goes to show that after gastro-enterostomy the ulcer will eventually heal, but the results are not as good as in the former class of cases. The pylorus being open and the stomach small, it is self-evident that the main function of gastro-enterostomy is already well performed, and it is probable that in some cases the artificial opening will not remain patent.

In two of these four cases secondary kinking of the small bowel at the anastomotic opening caused symptoms of chronic obstruction, and in both of these cases the communication was, at the second operation, found to be much reduced in size. In one case but six weeks had elapsed, in the other thirteen months. Theoretically we would expect the opening to close in this group of cases; the pylorus being of good caliber and the stomach properly emptying itself, the fistula becomes cicatrized from non-use. In the contraction attending this closure the attached intestine in these two cases was angulated, causing distress. Entero-anastomosis between the two limbs of the attached intestine promptly afforded relief. Taken alone, this would seem to contra-indicate gastro-enterostomy on the small stomach, but this

is not just to the operation, as both of these cases were cured of the ulceration, as shown at the second operation. The temporary arrest of stomach activity and prompt drainage of ingesta allows speedy healing of the ulcer. It must also be borne in mind that these cases represent the chronic and intractable variety of ulceration. The majority of dilated stomachs are due to old ulcers which have permanently closed and only the mechanical interference with the progress of the food remains.

Benign Obstruction at the Pylorus.—Pyloric obstruction of benign origin is usually the result of the healing of an ulceration in the vicinity of the pylorus. In some cases it is due to valve formation, a condition to which I called attention in a paper read at the Atlanta meeting of the American Medical Association in 1895. Obstruction from without the stomach, due to pressure of tumors or adhesions, may also be an indication for operation. In some cases a dilated stomach is found without apparent obstruction, but as the muscular wall is often greatly increased we may take it for granted that some interference with prompt emptying of the gastric cavity exists. Non-malignant obstruction of the pylorus is usually accompanied by great hypertrophy of the stomach wall, with dilatation in the later stages, and may be aptly compared to the heart with valvular insufficiency. Most of these patients eat but little, and unconsciously try to accommodate the food, quality and quantity, to the diminished gastric musculature. Others wash the residue out of the stomach with a stomach-tube. Vomiting is not as common a symptom in these cases as in those of more acute character, although in the later stages vomiting of large quantities is to be expected. A peculiarity about some of these cases is the formation of a gastric pouch, due to the more rapid stretching of the greater curvature. It is for this reason that pyloroplasty may fail to cure. The pylorus being held high, even if the opening be made of ample size, the fatty-degenerated muscle fibre is unable to elevate the food from the pouch, and the patient is not materially

relieved. In fourteen pyloroplasties we were compelled to make gastro-enterostomy six times as a secondary operation. It is in these advanced cases that gastro-enterostomy has the great advantage over pyloroplasty. The opening can be made at the bottom of the pouch, furnishing adequate drainage.

Hour-glass stomach in rare instances may demand gastro-enterostomy upon the proximal pouch. We had one such case. Gastroplasty is, however, the operation of choice, as shown by Watson. We have performed gastro-enterostomy thirty-five times for benign obstruction of various forms, with one death, this in a case of chronic starvation of most profound character. Analyzing the sixty-four gastro-enterostomies upon which the report is based, we find an average mortality of something less than 10 per cent., highest in the malignant cases, as would be expected, 25 per cent. For open ulcer, between 7 and 8 per cent., and the condition of the average patient with an intractable ulceration would lead us to expect this death rate, although if performed at an earlier date it should not exceed 5 per cent. In the benign obstructions which form more than one half of the cases only one death in thirty-five cases, or less than 3 per cent., occurred.

The operation has three points of interest. Shall it be made with the suture or with the Murphy button? This is a matter of individual preference, the results being about the same. We have used the button altogether and see no reason to change. Another open question is whether the anastomosis should be made to the anterior wall of the stomach (Wolfler) or to the posterior (Von Hacker). We have performed the anterior fifty-five times, witth splendid results. In the last year we have made a few posterior, nine in all; they have done just as well in every respect.

The point of great importance is that in either operation the juncture should be at, or near, the greater curvature and at the bottom of the stomach pouch. By actual observation of our own cases we found that the opening properly placed,

either anteriorly or posteriorly, came within one inch of the same point in the gastric cavity. The attached wall of the stomach promptly assumes a funnel shape and regurgitant vomiting is seldom seen.

Lastly, shall the two limbs of the bowel be separately anastomosed (Baun) as a primary operation? If the above method of securing a low union with the stomach be carried out it is usually unnecessary. As a secondary operation, however, the method is of unquestioned value. It sometimes happens that, either by adhesions or angulation, distress will be occasioned by small amounts of bile passing into the stomach, which may or may not be vomited. I wish to call especial attention to this condition following gastro-enterostomy. In going over the literature it would seem to be only met with immediately after operation, frequently causing death from the so-called "vicious circle." Carle showed by experimentation that small quantities of bile were found in the stomach for a long time after gastro-enterostomy, but that it caused no trouble. We have met with this condition months after the operation, but it did cause distress, although not usually attended with vomiting of food. At times a mouthful of bile-stained fluid would be regurgitated or could be washed out of the stomach by gastric lavage. I am uncertain whether this is due to the regurgitation through the open pylorus or through the fistula. In the three cases referred to, the operation was performed for the relief of ulcer with unobstructed pylorus. At the second operation the fistula was found much reduced in size, with some angulation. Entero-anastomosis cured these cases. It would seem that primary regurgitation of bile and pancreatic juice could be prevented by a low location of the fistula, and that secondary regurgitation would not take place in pyloric obstruction, but with an unobstructed pylorus, as when the operation is done for open ulcer entero-anastomosis as a primary operation would be indicated to prevent these delayed but unpleasant symptoms.

In the future we will make an entero-anastomosis in every case in which gastro-enterostomy is performed if there be no obstruction of the pylorus. That this is clearly indicated is shown by the three secondary operations in thirteen cases. In obstructed pylorus we did not have a single instance in over fifty operations, and therefore it could not be considered in this the larger group.

DISCUSSION ON THE PAPERS OF DRS. MARTIN, McGRAW, WYMAN, AND MAYO.

Dr. L. B. TUCKERMAN, of Cleveland, Ohio.—Mr. President: I shall not attempt to say anything in regard to the questions of technique which have occupied much of the attention of the Association this morning. I am a general practitioner, and the occasional operations which I do, do not entitle me to hold or express any authoritative opinion on the relative value of these various methods. But I wish to emphasize the paper of Dr. Martin, and more especially the value to the surgeon and the general practitioner of instruments of diagnosis which he has so perfected that they are readily used. Some two years or so ago, when Dr. Martin demonstrated on the living patient the existence of rectal valves before the Cleveland Medical Society, and which he has shown you in the specimen that has been passed around, I concluded there was a region of the body of which I was ignorant, and I immediately provided myself with proctoscopes, and when I began to use them, I found the explanation of some things which had been beyond my ability to diagnosticate before. There was in my medical service in St. Alexis Hospital a case of obscure bowel trouble of which no satisfactory diagnosis had been made. I made a digito-rectal examination. I made a most careful examination from above, but could not find out anything. Putting the patient in the knee-chest position, with the use of the proctoscope, head-mirror, and lamp, there was revealed through the proctoscope, springing from the anterior portion of the rectum, just above the reach of the finger, a tumor about the size of a hickory-nut projecting up into the lumen of the gut, and there we had an explanation of the symptoms manifested by the patient. The tumor was plainly visible to the eye. It proved to be a sarcoma. The patient left the hospital and entered another institution, where a colos-

tomy was performed. He experienced marked relief for a time, but of course eventually died. That diagnosis would have been absolutely impossible without the use of the proctoscope until the tumor had become so large as to probably preclude any palliative operation.

Then there occurred two other cases in the hospital. I was in charge of the medical service, and the surgeon turned these over to me as medical cases. I used the proctoscope, and in both cases the valves which Dr. Martin has shown you in the specimen came together, and the curious thing was that as you felt them with your finger they gave the impression of a close annular stricture, but on putting the patient in the knee-chest position the stricture in each case resolved itself into two valves overlapping and in close proximity. Section of the valves cured one patient, but did not cure the other. Some of the symptoms were relieved, particularly those referable to the lower part of the rectum, but there remained an obstruction farther up and the use of the longer proctoscope revealed a stricture of the transverse sigmoid, which was diagnosticated to be due to a band of adhesions occluding or constricting the sigmoid and attached to a movable ovary. We settled that point by catching the mouth of the uterus with a tenaculum. Moving the uterus did not cause displacement of the stricture, so it was evident that it was not attached to the uterus. But the moment we touched the stricture itself with a ball of soft cotton there was produced an acute ovarian colic, showing a connection with the ovary. Laparotomy was performed and the diagnosis of an adhesive band attached to an ovary was verified. There was such a band extending from the rim of the pelvis near the spine, passing over the transverse sigmoid and attached to an enlarged movable left ovary, and whenever the ovary dropped into Douglas's pouch it puckered the sigmoid like a purse-string. Removal of the constricting band relieved the obstruction. Ovaries and uterus were, however, diseased and were removed as well. I want to say that I have used this instrument of precision (the proctoscope) in a number of cases of obscure bowel trouble and have found the cause to be either pseudo-membraneous proctitis or ulcer, or, in one case, cancer of the sigmoid, all of which, excepting the cancer, proved readily amenable to treatment so soon as the cause was demonstrated. If the gentleman who spoke of dysentery will use the proctoscope habitually, he will find a good many of these dysenteries are due to lesions situated within six inches of the margin of the anus, plainly visible, and amenable to successful local treatment through the proctoscope.

DR. A. J. OCHSNER, of Chicago, Ill.—I will discuss but the one feature of these papers connected with gastro-enterostomy. For a number of years I treated my cases of carcinoma of the stomach by irrigating the stomach and giving the patients concentrated food, irrigating before and after feeding and permitting them to die as easily as possible, because the operation of gastro-enterostomy was not satisfactory. Too many of the patients suffered from what is known as the "vicious circle"—constant vomiting—or from late vomiting, so that the patients did not get much benefit from the operation. About three years ago Dr. Mayo pointed out a condition which before that time did not occur to me, and so far as I know had not occurred to any one else. He pointed out the fact that these patients vomit because it is the easiest thing in the world for fluid to run down-hill.

A gastro-enterostomy, whether it was made in front or behind, was not made in the lowest part of the stomach. The reason why no one made a gastro-enterostomy in the lowest part of the stomach was because of the large blood-vessels. Every one who operates upon the stomach knows that he is confronted with large blood-vessels along the lower border of the stomach, and he consequently selects a place to make gastro-enterostomy where he does not come in contact with large vessels. Dr. Mayo ligates one or two of these vessels, and makes his incision along the lower edge of the stomach, and this "vicious circle" disappears. Since that time I have performed the operation in a good many cases—I do not know how many—and the patients have not had vomiting, because the fluid can not run into the stomach when the stomach is higher than the intestine. If you will disregard the large blood-vessels on the stomach, simply ligate them, make your gastro-enterostomy as far back as possible from the carcinoma and still at the lowest point, I am sure your experience will be the same as mine.

I will state that I use the Murphy button in making this operation.

DR. J. HENRY CARSTENS, of Detroit, Mich.—Just a few words in regard to the elastic ligature mentioned by Dr. McGraw. I have seen it used a number of times and I have used it myself, and I know that the results are excellent. I know that there exists more or less fear in the profession about using this ligature that it would not cut through, but experiments have been made to show that it will make a large opening. Let us take debilitated subjects, in whom prolonged operations are not indicated, where we have to work rapidly, and certainly this is a most ideal method.

Naturally, it takes a good many cases to demonstrate its exact place in surgery, but in weak, run-down patients, such as we sometimes have, where rapidity of operation is very desirable, this is an ideal ligature.

With reference to the paper of Dr. Wyman, who advocated opening the intestine in cases of typhoid fever, I have very grave doubts about the practicability of this procedure in cases of probable typhoid perforation. Those of us who have been in general practice and have seen cases of typhoid fever of the most pronounced type know that some of them have recovered where we expected or anticipated perforation but perforation never occurred, and I would not like to go on record as advocating such a procedure, nor would I like it to go out among general practitioners that it is a simple thing to cut down through the abdominal wall, open the intestine, and wash it out. The opening of the abdomen under any circumstances is a serious operation, no matter how simple the case may be. When we have a patient weakened with typhoid fever and open his abdomen, if we take out a loop of intestine and stitch it to the outer edge, it is a serious operative procedure. Besides, I do not know whether we can cure ulceration of the bowel by the application of any remedies or by washing the bowel out. I have grave doubts about the efficacy of any solution, be it carbolic acid or any other, in curing such ulcerations. I trust to the *vis medicatrix naturæ*.

In regard to the paper of Dr. Mayo, it simply shows what great work he is doing up in the little town of Rochester, and what wonderful progress abdominal surgery has made in every part of the country.

Dr. Charles Davison, of Chicago, Ill.—I wish to add one more case with the Connell suture which has not been reported. It was a case of tuberculosis of the cecum. The cecum and a part of the ileum were resected and sutured by the Connell method a little differently from that done in Dr. Walker's case. The ileum was cut diagonally so as to make an opening of the same size as the cecum, uniting them without any puckering, so as to avoid any pouching in the cecum and also to keep the regular angle between the colon and ileum.

In doing the operation there were two things I was surprised to find important. First, the rapidity of the operation. It was my first case. I have done many Murphy-button operations, but I must confess that I did the Connell suture with greater rapidity in my first case than I did the Murphy button in my last case. Second, the suture constricted only

alternate parts of the intestine, so that one half of its circumference was not constricted at all, allowing free circulation, easy adhesion, and free drainage into the intestinal cavity.

DR. J. LIVELY JOHNSON, of Louisville, Ky.—I simply wish to refer to end-to-end anastomosis of the intestine. Several years ago, while in New York working on a cadaver in making an end-to-end anastomosis, I found it a somewhat difficult procedure, and it seemed, after watching some guinea-pigs gnawing on carrots, that I could possibly make a cylinder of one of those carrots and introduce it into the intestine and thereby do a quicker and easier operation. These cylinders may be made of any vegetable substance, of paraffin, of gelatin, or anything of that character. Of course, it is important to have the cylinder correspond with the size of the bowel to be operated upon. You simply take the intestine, after it is prepared for suturing, and introduce one end of this cylinder into the end of the severed intestine, and as it is introduced it invaginates the gut sufficiently to bring the peritoneum in contact all around the cylinder on the outside, with the raw surface upon the inside. If this cylinder was a little larger it would invaginate the gut as I pass it in. You pass the other end of the gut over the opposite end of the cylinder, which it also invaginates. It turns under at this point (illustrating). Now, you see, you have the gut in this position, with the peritoneum of the opposite ends in contact all the way around the cylinder. I should have said that you should close the mesentery up close to the gut before introducing the cylinder. If you have an assistant hold it you can sew rapidly, just as rapidly as you can sew a piece of cloth. I make the anastomosis with interrupted sutures of fine silk. This operation is simple and easy and it can be quickly done. I think it is much better than the use of the Murphy button, for the reason that you have a soft cylinder which can be left *in situ* without any fear of causing trouble. I have made the anastomosis inside of three minutes. It can be done more quickly than one can put in a purse-string suture for the use of the Murphy button. Furthermore, you will not have any symptoms following the retention of any foreign substance in the gut, requiring a secondary operation for its removal. As I have previously remarked, I have done this operation a number of times, and I must say it is the most perfect means of making end-to-end anastomosis I have ever seen. You can nearly always find a potato. If you can not, you may take a piece of turnip, or any other substance of a similar

character. You may make these cylinders of gelatin or of paraffin. I should like you to try this method in some future cases when the opportunity presents. Be careful to close the mesenteric junction of the gut with good sutures on each side before making the anastomosis.

DR. A. M. PHELPS, of New York City.—I have only a word or two to say in regard to end-to-end anastomosis of the intestine. In some of our cases post-mortem examinations reveal the fact that there has been sloughing of the intestine on the outer side where vascular supply is defective, and it is for that reason, instead of putting the intestine together in the normal position, it is turned half around, so that the vascular supply from the mesentery will supply the other side of the intestine (the outside part) and keep up the nutrition of the parts. I think it is important that the intestine should be turned half around, and in this way increase the vascular supply and prevent ulceration.

In regard to the proposition advanced by Dr. Wyman, in 1895, in a discussion before the New York Academy of Medicine, I presented a series of cases operated on for various ulcerations of the colon, and more particularly those cases of extensive ulceration of the rectum and sigmoid flexure found in syphilis. These cases are difficult to cure, on account of the fecal matter which passes over the diseased area. In the City Hospital we cut down upon the cecum, pulled the cecum out, and established an opening, so that the fecal matter from the ileum would discharge outside and not go into the colon, and then we could wash the colon from the ileo-cecal valve through and keep it absolutely clean. It is not necessary to use any medication unless you desire to do so to turn away the tide of fecal matter and keep the mucous membrane of the colon absolutely clean, and we succeeded in curing many cases of extensive ulceration of the rectum which had extended up into the sigmoid flexure, and even higher, from syphilis, and more particularly in those cases of tubercular ulceration of the colon. It is an important operation to perform where you have a diseased colon.

So far as typhoid fever is concerned and the perforation of the intestine, when the latter occurs it requires immediate operation, but I am in doubt as to whether anything is gained by washing the intestine in cases of typhoid fever. However, if I find perforation has occurred, or that you will get a subsequent perforation, I should have no hesitancy in turning the fecal matter away and washing the intestine.

With reference to the remarks of the last speaker (Dr. Johnson), I will say that some ten years ago Dr. Abbe pre-

sented to the New York Academy of Medicine a potato cylinder, with a hole in the center of it for the purpose of suturing the intestine, almost identical with the proposition he had advanced.

DR. WILLIS G. MACDONALD, of Albany, N. Y.—It occurs to me that this discussion on intestinal surgery is an important one, a discussion in which even after all of our years of gastric surgery there seems to be something yet new, and something of great value still. After some little experience in resection of the intestines, lateral anastomosis for whatever condition on the gastro-intestinal tube may be required. Other things being equal, it has seemed to me recently that the simple, natural, and short methods of intestinal surgery are by far the best. Aside from that, there probably has never been invented or demonstrated any mechanical device which so fully fulfills all the indications and is uniformly so safe and so successful in surgery as is the Murphy button. The method of decalcified bone, the bone bobbins of Mayo Robson, the celluloid tubes or cylinders by which resections have been made from time to time, present to my mind no very definite advantages which can not be as easily attained by the Murphy button, and as safely so likewise.

The other matter, of surgical intervention in typhoid fever for intestinal perforation, I think opens up an important field for discussion. When many of the symptoms are present which constitute the indication for the operation, as presented by Dr. Wyman, we may safely say that perforation has not already occurred, but that it is impending, and that operation undertaken at that time is very likely to be an operation for perforation of the intestinal tube. When we come to read our text-books on typhoid fever, and enter into a discussion of the symptoms of perforation of the intestine, we can readily appreciate what was said by Dr. William Osler, namely, that the usual symptoms of perforation of the intestinal tube, as detailed in the text-books, are not the symptoms of perforation, but the symptoms of death. If we wait for that long series of symptoms of collapse, the condition of increased abdominal distention, etc., we will find in many cases that it is too late to operate with benefit. But a careful consideration of the subject from the standpoint of Dr. Wyman will do good, in that it will lead us over the divide and bring many cases to us where surgical intervention promises to do good in this very serious disease.

DR. MARTIN (closing the discussion on his part).—There is one thing I wish to add, and that is an explanation of the case of the child which was read to you. The rectum of the

patient was divulsed during infancy by means of the two-bladed rectal speculum. This was followed by great benefit. The patient thus experienced divulsion of the overlapping rectal valves, the instrument being applied twice prior to the fourth year of the child's life. Up to that time the rectum was no longer than the blades of the speculum. After six years, when the third application of divulsion was made, the rectum had so increased in length that the rectal valves were carried beyond the reach of the speculum, and hence no further divulsion of the valves by this means was possible.

DR. MCGRAW (closing the discussion on his part).—In regard to the "vicious circle," I practiced gastro-enterostomy for a great many years before I had a case of "vicious circle," then I had two in succession. One patient kept getting a little better, then he would get worse, and just before I was going to operate he died. I found that the jejunum had been made a little too short, the afferent portion, and it pulled the stomach down a little. The trouble does not come because we make fluid run up-hill, but it occurs because the fluid enters the wrong channel. It goes down into the afferent portion of the jejunum and into the duodenum, instead of going into the efferent portion of the jejunum and down into the ileum. When once it gets down into the duodenum we have an inhibitory action, as has been demonstrated, so that the stomach will no longer contract.

In my second case I operated early, and I found the trouble came from a twist in the posterior wall of the stomach. I had followed out the German method of turning the coil so as to make the peristaltic action of the stomach and intestine correspond, which I am convinced is a wrong method. The twist in the posterior wall of the stomach occurred in such a way that the fluid that was taken into the mouth went into the proximal portion of the jejunum instead of into the ileum. I made an entero-enterostomy in addition, and the man recovered.

A word or two with reference to the Murphy button in those cases referred to by Dr. Mayo. In cases of ulcer of the stomach, for which you do a gastro-enterostomy, you should make the communication large enough so that it will not close up. In benign strictures of the stomach, and in those cases of operation for ulceration of the stomach, with the Murphy button there is time enough for the orifice to close. As time goes on, contraction will take place. A doctor in Boston had such a case, operated with the Murphy button successfully, and the patient went on for about a year, then

symptoms of ulceration recurred. He cut down, opened the stomach, and found the orifice had contracted materially, so that it was not larger than a lead pencil.

DR. A. H. CORDIER, of Kansas City, Mo.—There was one point in the paper of Dr. McGraw that I wish to speak of, and that is, many cases of intestinal obstruction requiring operation need an immediate communication between the portion of the bowel above and below the obstruction, and in that event we must resort to some method that will establish the continuity of the canal in a shorter period than would be expected to obtain by the use of the elastic ligature.

DR. MCGRAW.—When I was reading my paper, I began by saying that the ligature was the best method for a partial stenosis, and I believe I emphasized the word partial. In those cases of acute obstruction where it is necessary to open the upper portion of the bowel and let out a considerable quantity of fecal matter, then the ligature is not the proper method.

Dr. CORDIER (resuming).—About eleven years ago I did considerable experimental work on animals with the elastic ligature, and without a death in a single case, yet I have never used it in the human being.

I wish to call attention to one or two features endorsing the position taken by Dr. Mayo in regard to the use of the Murphy button. In doing gastro-enterostomy or gastro-jejunostomy my experience has been practically the same as his. I have had quite a number of cases, without a death, and I have used the Murphy button in every case. It does not appear to me to make any difference whether the operation is done in the anterior or posterior wall of the stomach. The idea of this being a drainage operation is not understood by the profession. The stomach becoming sacculated, the larger end of the organ sinking lower in the abdomen, with the pylorus at a fixed point, if you will make your anastomosis and not make too long a loop between the pylorus and anastomotic point, you will not have fluids going back up into the duodenum, with the difficulties that many complain about. I put the bowel in the same place that Dr. Mayo does, and so far I have not had any trouble with the "vicious circle" that has been mentioned by Dr. McGraw in his two cases.

DR. HAL C. WYMAN (closing the discussion on his part). I simply desire to express my appreciation of the discussion that my paper has received. I was very much interested in the papers presented by the other gentlemen, particularly the one dealing with gastro-enterostomy. It has occurred to me that perhaps a little more attention should be given to

the relation which the transverse colon bears to the stomach, and if this is done in gastro-enterostomy we would obviate a good deal of difficulty in many cases. I do not think it is so much a matter of the method that may be used. The main point is to have an ample opening, and in order to be sure of that and of safety to the patient, it is necessary to be certain that the methods carried out are unaccompanied by any great tension upon the sutures. If distention of the colon at that point causes dragging upon the point of attachment between the intestines and stomach, there is danger of leakage. You can readily see how many accidents following operation might result from that cause. It is possible that this may be the cause operating in some other cases after union is thoroughly established.

Once more, I desire to say that I am very much pleased with the discussion, and I thank the gentlemen particularly for their kind reference to the operation I proposed for the treatment of typhoid fever. This is not the place for a man to express his belief, but the man who does his whole duty by his patients will find some cases amenable to surgical treatment; cases that are hopeless, if left to themselves, will have better opportunities for recovery if the cecum is opened and the ulcerated area relieved of tension and drained.

DR. WILLIAM J. MAYO (closing the discussion on his part).—In the first place, I want to say a word or two in regard to intestinal anastomosis in gangrenous hernia. It is upon the proximal side that we get the secondary perforations. We will find in these cases thrombosis of the vessels, with little spots sometimes a foot or two feet apart in the intestine, where it looks perfectly healthy, where the peritoneum is of good color, and yet perforation occurs secondarily. If we operate on some of these cases, when in bad condition, and excise the total amount of intestine that should come out in order to be sufficiently high on the proximal side to secure a good surface of bowel to make the attachment, the patients will frequently die from shock on account of the large amount of intestine that must be removed. Ordinarily speaking, when the peritoneum is bright and clear such a bowel can be returned, provided it is in the hernial sac; but if you operate on the more or less damaged bowel, adding to that the traumatism of the operation of anastomosis close to it, you are liable to get secondary perforation. I have seen such perforations, and I believe this is the experience of other surgeons. An easy to way avoid it is this: This is the proximal portion (demonstrating) of the intestine. On the

distal side it never perforates. Cut out the bowel which is manifestly bad. Close the end of the proximal piece entirely and slip it down, make lateral anastomosis at such a point above as will give you bowel that is absolutely safe. If your anastomosis is made in that way, I am sure you will save patients who would otherwise die from perforation on the proximal side.

Before taking up the discussion of gastro-enterostomy and referring to what Dr. McGraw has said, I wish to ask for him the privilege of making a reply, because it may be I did not understand him correctly in this matter. Dr. McGraw spoke of experiments that were made on animals with a healthy pylorus. Therefore, I think those experiments, like many other experiments made on animals, can not be directly applied to diseased conditions. Next, Dr. McGraw says that if we do an entero-anastomosis in each case, this "vicious circle" will not take place. I would say that if we should do such an operation as will not kink or loop or make some obstruction, it is an admission of the fallibility of the position taken by him. If he makes an anastomosis between the two portions, distal and proximal, he will not have the "vicious circle." That is an admission he has obstruction, or why would entero-anastomosis prevent? It could not be otherwise. He simply relieves obstruction before it takes place. How does he get it? As I understand the operation he makes, it is this: He draws the intestine out of the abdomen, passes it over the omentum and transverse colon, tears a hole through the anterior surface of the gastro-colic omentum, passes the bowel behind through this hole, and makes his anastomosis. I can only say, speaking wholly from theoretical grounds, that it is surprising to me that the doctor has not had obstruction in more than two cases. I say this with all due deference to his experience, and I would ask the question whether that has been his experience when he has made an operation on the anterior wall of the stomach low down, or the posterior wall, without passing the bowel completely around the transverse colon?

A word or two in regard to the secondary difficulties arising after gastro-enterostomy. These are going to come up. I have had three such cases. How does it happen? Is it because we do not make the opening large enough that we then get the "vicious circle"?

DR. MCGRAW.—Not the "vicious circle."

DR. MAYO.—I am speaking of the secondary effects that come on months afterward.

DR. MCGRAW.—You misunderstood my remarks.

DR. MAYO.—In the cases I had, the difficulty came on weeks or months after the operation, and why? Because there was an open pylorus. The pylorus being open, the anastomosis between the stomach and intestine was unnecessary so far as the stomach was concerned, and it would be reduced in size, I do not care how big the opening is. It is an unnecessary opening made for a temporary purpose. It is one of the rules in surgery that fistulous communications that are unnecessary will become more or less reduced in caliber. In the stomach this makes practically no difference, but when you have bitten out with button or suture a piece amounting to one third the lumen of the intestine, it does make a difference. If the fistula reduces one half you are liable to get a kink. I got it in several cases of ulcer, with an open pylorus as a late secondary condition.

I want to ask the president, Dr. Cordier, to bring up a point which he mentioned a few days ago in regard to securing the lowest point of the bowel by means of fastening the pylorus with the suture.

DR. CORDIER.—The point is where the pylorus is down quite low at the time of anastomosis. In one of my cases I raised the pylorus up to throw drainage down, stitched it underneath the liver, so that I got my drainage at the bottom —in other words, got the faucet at the bottom instead of in the bung-hole, so to speak.

DR. H. O. WALKER, of Detroit, Mich.—With reference to the needle and thread, unquestionably it gives the widest opportunity for doing intestinal surgery. Mechanical devices, either as aids or in doing direct work, are often at fault and are unable to do the work. Therefore, he who contemplates using the needle and thread in his surgical work must know how to use them. He must necessarily have a good deal of practice in reference to this matter, and so far as quickness is concerned it can be done as quickly as by mechanical devices.

In reference to wounding the intestines, I have found that this can be overcome by omental splints, dragging down the omentum and sewing it over, as I did in the case in which I removed a large piece of the colon.

With reference to the paper of Dr. Mayo, I agree with him in everything that he has said in regard to gastro-enterostomy. These operations are not only palliative in character, but in a number of instances are curative.

DR. MAYO.—I would ask the privilege of the Association that a few moments be given to Dr. McGraw, so that he may make such a reply as he desires to what has been said.

DR. MCGRAW.—I want to refer to one or two points. I did not read that portion of my paper with reference to gangrenous hernia. I advised in my paper to bring down the gut, if there is a gangrenous portion cut it off, put in the elastic ligature high up, so that the elastic ligature will cut through in three or four days and you will get anastomosis, and the open mouths of the bowel will afterward heal, because there will be a passage higher up. This is the safest way, in my judgment, of treating that class of cases.

In regard to the contraction which was spoken of in cases of gastric ulcer, I think Dr. Mayo is right. In all of those cases where I did a gastro-enterostomy, there was a much greater tendency on the part of the orifice to close. Whenever the pylorus is open the orifice will tend to close, and for that reason, in cases of chronic ulcer, it is a condition which will last hardly a year. If you make a gastro-enterostomy for the purpose of permanently benefiting the patient, you must make a large opening, and then make an entero-enterostomy. That is my idea.

XXXIX. FEATURES DETERMINING PERMANENCY OF CURE IN RADICAL OPERATIONS FOR HERNIA.

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There is no surgical subject, with the exception of appendicitis, which has received so much attention in the literature of the past five years as the subject of hernia.

In looking up the literature I have encountered over three thousand monographs, or abstracts of these, in the English, German, and French languages alone.

It would consequently seem as though this subject must be permanently exhausted.

There are, however, some important features which are not practically applied by many surgeons who perform operations for the radical cure of hernia, probably because they are buried in the mass of facts and fancies which the modern hernia literature contains.

The relative safety of the operation, the great relief it gives to the patient, the fact that it enables him to perform more profitable work, and that it relieves him of the danger and consequent fear of suffering at any time from the hazardous complication of a strangulation, have induced many patients to undergo the operation for radical cure of hernia.

That the operation is almost absolutely safe if performed by a competent surgeon under proper conditions has been demonstrated beyond a doubt by the statistics of many surgeons, notably by those of Coley and Bull in this country.

With a safe operation whose results are so eminently beneficial, there can be no question of greater importance than the question of permanency of cure.

For years I have followed the literature, as well as my own work, with a view of determining the causes which lead to success in this direction. I am convinced that the permanency of cure depends upon a small number of very simple features, and if these are secured one can obtain a permanent cure in almost all cases of hernia.

Some of these have been generally accepted and are familiar to all surgeons and given in all modern text-books of surgery. Most of the other features are employed by all surgeons who are successful in obtaining a permanent cure regularly in their herniotomies, although the success is often attributed to unimportant matters of detail or to some special method. Consequently there is nothing new or original in what I will have to say. This paper is simply intended to point out the reasons why successful herniotomists secure permanent results with great regularity, without introducing any features which have no bearing upon this especial phase of the subject.

1. *The wound must heal primarily.*

This fact is so well known that it needs scarcely to be mentioned. The primary union of a wound secures an attachment of the tissues placed in apposition at the time of

the operation without the interposition of any considerable amount of cicatricial tissue. Experience has taught us that cicatricial tissue is less stable than any other tissue in the body, hence its elimination by securing primary union is the most important feature in this operation.

If the wound has healed primarily there is practically no cicatricial tissue between the surfaces brought in apposition. In fact it is often scarcely possible to determine its presence in a microscopical section. The tissues are soft and elastic and it is scarcely possible to determine the line of union in the deep tissues; there is consequently nothing to give way and cause a recurrence.

2. *The stitches must not be drawn tightly, in order to avoid pressure necrosis.*

During the healing of every wound there is a certain amount of edema during the first few days following the operation, resulting from the interference with the blood-vessels and lymph spaces. This is still further increased by the additional disturbance caused if the stitches are tied very tightly.

There is probably always a certain amount of pressure necrosis wherever a suture is used, but this can be reduced to a minimum by drawing the stitches just tightly enough to bring the surfaces barely in apposition. The edema which follows will increase the tension of the stitches to some extent, but it will subside much more rapidly than it would were the stitches drawn more tightly.

In case there is pressure necrosis, the tissue destroyed will be replaced by cicatricial tissue, which may jeopardize the permanancy of the cure if it is quite extensive.

Moreover, the presence of even a small amount of necrotic tissue will furnish a favorable culture medium for any pathogenic micro-organisms which may have been introduced into the wound accidentally and which would otherwise have been destroyed by the healthy tissues. Thus drawing the stitches tightly may indirectly prevent primary union.

3. *The edges of the surfaces to be united must be free from fat and other unstable tissues.*

In order to secure a stable union the tissues brought in apposition should themselves be stable in character. No matter how perfect a union may be, if the attachment is to a tissue which in itself has no resistance the union is of no value, because the interposed tissue will give way as soon as there is increased intra-abdominal pressure, and a recurrence is inevitable.

It is consequently necessary to carefully dissect away all soft muscular or connective tissue as well as all masses of fat. For the same reason all hemorrhage should be carefully controlled in order to prevent the interposition of blood-clots between the surfaces to be united.

4. *The tissues should be manipulated with the greatest care during the operation.*

There is no doubt but what tissues which have been bruised by rough handling during an operation do not heal so perfectly as those which have been treated with the greatest care.

The less the tissues are disturbed the greater will be the likelihood of an ideal primary union. This is also true as regards the length of time consumed in these manipulations. In a general way it may be said, other things being equal, "the shorter the time consumed in performing a perfect herniotomy the better will be the result."

5. *The wound should be supported by broad rubber adhesive plaster strips.*

During the process of healing it is desirable to have the wound disturbed as little as possible, in order to reduce the cicatricial tissue to a minimum.

I have observed that broad strips of adhesive plaster carefully applied will aid materially in securing this desirable condition of rest.

6. *The patient should be kept in bed for two or three weeks.*

Authors differ as regards this point, but it is a well-known fact that freshly united wounds more frequently give way than older ones, and although I have never tried the plan of permitting these patients to be about after eight or ten days, and can consequently not give my opinion regarding this feature upon personal experience, it seems reasonable to give the wound an abundance of time to become firm.

7. *After the operation abnormal intra-abdominal pressure should be eliminated.*

Quite a large number of herniæ result from abnormal intra-abdominal pressure; in another large number the herniæ resulting from some other cause are increased in size by this cause. It is consequently desirable to eliminate this cause after operation upon the hernia in order to insure permanency of cure.

Constipation is the most common cause of abnormal intra-abdominal pressure, which can of course be easily eliminated. Next in order is obstruction to the passage of urine on account of urethral stricture, phymosis, or enlargement of the prostate gland. These causes should also be removed if possible.

Obesity is another general cause of recurrence, which should be overcome by proper systematic dieting and exercise.

So far only general conditions have been considered, which apply to all forms of hernia alike. It now becomes necessary to consider each one of the four principal forms of hernia separately. These will be considered in the order of their frequency of occurrence.

I. Inguinal Hernia.

In this form of hernia it is especially important to secure a substantial union throughout, between Poupart's ligament on the one side and the tissues of the internal oblique and transversalis muscles on the other. It is especially impor-

tant that the upper portion of these tissues be perfectly united, because it is in this portion that the defect occurs in case of recurrence.

1. In order to secure this condition, the portion of the sac contained in the inguinal canal must be removed well up into the peritoneal cavity, so that no portion of it can be interposed between the layers. In ordinary cases the entire sac should be removed; in cases of congenital hernia the lower portion of the sac may be left to make a tunica vaginalis. In very large herniæ with thick adherent sacs it is quite as well simply to resect the portion in the inguinal canal, the important point being to remove the portion which might be interposed between the two layers mentioned above.

2. For the same reason it is important to dissect away all portions of fat, loose connective tissue, and muscle which might become interposed, especial care being taken to expose the ledge formed by Poupart's ligament.

Occasionally a long, thin omentum has a tendency to insinuate itself in any available deficiency in the closure of the inguinal canal; it is consequently best to resect any portion that reaches beyond the internal abdominal ring.

II. Femoral Hernia.

In this form of hernia the opening through which the sac protrudes is a perfect ring.

Our experience in surgery teaches us that it is practically impossible to prevent a ring in any portion of the human body from closing, provided it is not lined with mucous membrane or a serous lining, consequently it is not necessary to do anything beyond dissecting out the entire sac well up into the peritoneal cavity, ligating it well up, cutting away the portion beyond the ligature and permitting the stump to retract so as to leave the ring perfectly free.

A number of methods have been devised for closing this opening, all of which, with one exception, cause a certain percentage of recurrences.

The only harmless one of the many useless methods consists in a circular purse-string stitch, applied around the edges of the femoral ring. It is best not to meddle with the ring.

III. Ventral Hernia Following Laparotomy.

Permanency of results in operations for the relief of this class of herniæ depends upon the care with which all the anatomical layers are dissected out and the corresponding layers united.

After carefully laying bare all the layers, which can be accomplished even when a hernia has existed a number of years, I have found it most satisfactory to insert silkworm-gut sutures through all the layers down to, but not through, the peritoneum, from three fourths to one inch apart, and to leave these united until all the layers have been united separately with chromicised catgut sutures over all, being especially careful not to tie any of these stitches too tightly.

IV. Umbilical Hernia.

Until about five years ago the surgical treatment of umbilical hernia was most unsatisfactory, because the percentage of permanent cures was far below that in all other herniotomies.

At this time Dr. W. J. Mayo, of Rochester, Minnesota, described his ingenious method, consisting in an overlapping of the edges of the hernial ring, preferably from above downward, for a distance of one and one half to two inches after removing the hernial sac and disposing of its contents according to the conditions found.

It is necessary to dissect back the fat, so that the strong connective tissue of the two layers may become strongly adherent. Usually the upper edge of the ring is slipped underneath the lower one a distance of one and one half to two inches and sutured in place with three to five chromicised catgut stitches, then the lower edge of the ring is drawn upward and sutured in place.

It is remarkable how firm a closure this method will accomplish. It has been employed successfully in many cases by its author and I have used it myself, so far, in eleven cases, with the same result.

I have intentionally avoided statistics and quotation of authorities in this paper, because it would not be possible to do justice to the enormous literature upon this subject in so short a paper, whose object is simply to give in concentrated form the real causes of successful herniotomy.

DISCUSSION.

DR. DUNCAN EVE, of Nashville, Tenn.—Mr. President: I think Dr. Ochsner has asserted general facts that have been well established and proven to be axioms in regard to all hernia operations.

It has been stated that the question of choice of suture material is only second in importance to the choice of method of operation. The sutures that have been used with the greatest success, and we believe that contribute in a great measure to primary union of all hernial wounds, are absorbable ones. The objection that has been made, that the same can not be rendered perfectly sterile, we think altogether useless, for repeated bacteriological researches have shown beyond a doubt that not only catgut, but kangaroo tendon that has been prepared by the best established methods have been free from all kinds of bacteria. They can also be treated with chromic acid, so that they can remain in the tissues any desired length of time. Three or four weeks is about the time that is usually required.

We think the question of the size of a suture is very often of importance. The ordinary size should be about No. 3 catgut for the ordinary musculo-aponeurotic or deep layer, and No. 1 or 2 for the aponeurosis. When thoroughly prepared in cumol, or any other devised methods that are thoroughly established, we claim that none of the ordinary conditions of sinus formation, and hence relapses, as a result of weakening the canal, are at all apparent.

We think that the use of rubber gloves has done much to establish very favorable and satisfactory statistics. The mortality has been reduced by some of our best men in inguinal hernia operations to one half of one per cent. Again, we think the use of a spica of plaster-of-Paris had very much

to do with the success of the operation, particularly when we have restless patients or where we have children upon whom an operation is required to be made. I have not the least doubt that in all operations a plaster-of-Paris spica would be of very great service, and in all probability prevent the disastrous conditions or sinus formation that we occasionally have in patients that are restless, and where perfect immobilization is needful.

Again, I would state that the mortality of these operations, upon close investigation, has been found to be due to operators who have had very little or no experience. This matter was touched upon in a paper presented to the American Surgical Association last May by Dr. Coley, and it was shown without question, where it could be traced, that failure of the operation was caused by inexperience on the part of the operator.

In regard to inguinal radical cure operations, we think Coley has made a most admirable suggestion, namely, the use of a suture at the weak portion of the wound, where the cord emerges through the internal abdominal ring, bringing the internal oblique muscle into direct apposition with Poupart's ligament, making the cord, as it were, emerge between the two upper sutures.

With reference to the high ligation of the sac and the use of a purse-string suture in femoral hernia, I believe this method is now employed by most operators, and I think has given satisfactory results, for the ring can not be closed other than by such means.

The method the essayist alludes to as having been devised by Dr. Mayo for umbilical hernia is quite a unique operation. I had the pleasure of hearing a paper on this subject by Dr. Mayo at the last meeting of the American Surgical Association, and it made such a deep impression on me that I determined to try this method at the first opportunity, which I did with the most satisfactory results, as depicted by Dr. Ochsner.

DR. A. GOLDSPOHN, of Chicago, Ill.—I think Dr. Ochsner has covered the principal points with regard to the manner of doing that which we do, so far as the technique is concerned. But I would proceed differently, I think, in the use of the tissues. Uniting individually the aponeurosis of the external abdominal oblique muscle is one chiefly important feature in the belly wall, to hold or to prevent the return of hernia. If we grasp the upper edge of the hernial canal without any differentiation, *i. e.*, without separating the internal oblique and transversalis muscles beneath the aponeurosis from the aponeurosis of the external oblique, then we

unite these two structures (the aponeurosis and muscle beneath) together to Poupart's ligament or the lower edge of the hernial opening. That does not secure such actual and firm union of aponeurosis as we can get. We should start at the upper edge of the hernial opening, separate the transversalis and internal oblique muscles beneath the aponeurosis and unite these muscles to the posterior surface of Poupart's ligament, far outward toward the anterior superior iliac spine, laterally from the point where the cord comes out. Draw them down in masses and attach them to Poupart's ligament *posteriorly*, not to the lower edge of the hernial opening. I am in the habit of doing that by catching the lower edge of the hernial opening at right angles in a pedicle forceps and everting it by turning the handles downward toward the knee. That exposes the posterior surface of Poupart's ligament and enables one to anchor there the layer of muscles by themselves and leaves the upper edge of Poupart's ligament free to unite with the corresponding free edge of aponeurosis on the upper side of the hernial opening. You are practically making a two-tier operation, and by means of two rows of continuous catgut sutures, placed not over each other, but in shifted lines.

So far as umbilical and ventral hernia are concerned, as long as they are of moderate size there is no difficulty in curing them. But the rub comes when we get openings of three or four inches in diameter. Unless we use some additional device in the shape of an outside tension suture, none of the methods that have been referred to will suffice. It will not be possible to obtain a durable result, in such cases, if both *approximation* and *coaptation* of the wound edges are to be secured by the coaptation sutures alone. If they shall do their own work (coaptation) right, they must be relieved of the enormous tension by some other device for approximation. On that account, some years ago in a couple of such test cases, I devised the use of tension sutures about large openings here in a similar way as we cover a large defect after amputating the breast, for instance. I open the wound, take away all fat, have the edges of the hernial opening clear, and after the manner of a French surgeon, split down the sharp edge of the ring so as to expose the rectus muscle that lies near the edge and beneath the aponeurosis. The lateral edges of the wound are then approximated near the median line and the extreme tension is transferred to the sides of the abdomen by three to five double silver wire tension sutures 15 to 25 c.m. long, that are passed not into the abdominal cavity but just back of the recti muscles, with their ends over gauge buttons that bear upon the

outside skin and are located laterally from the lateral borders of the recti muscles about 8 to 12 c.m. from the wound edges in the skin. By these tension sutures we can approximate the lateral wound edges in the hernial opening sufficiently so that being relieved of the tension they can be approximated accurately, and preferably in three layers, which secure the best and most durable reunion of the chief structures individually.

DR. D. N. EISENDRATH, of Chicago, Ill.—I would like to ask Dr. Ochsner what suture material he prefers at the present time, because it makes a good deal of difference. Perhaps he uses silver wire, but it has objectionable features. It means great tension of the tissues in tightening the silver wire. While I was assistant to Professor Schede for a year, I saw a number of operations of that kind in which silver wire cut through easily, and it seems to me that would be an objection to Dr. Goldspohn's method of relieving tension from an umbilical hernia, and this point I would like to bring out. Our method which we propose to use of formalized catgut is one that has met with objection on account of the fact that we get primary union of the wound after fourteen days. After from fourteen to twenty-one days you will have apparently spontaneous suppuration of the wound, and the same thing happens with kangaroo tendon that has been sterilized five or six times. The point brought out by Dr. Ochsner will meet with the approval of all of us, and that is the question of fat necrosis. Every one who has done a great many laparotomies and hernial operations must have observed the fact that there is a considerable amount of subcutaneous fat, and that frequently globules of this fat become detached and predispose, on account of their necrosis, to suppuration. The important points are, in every hernial operation, to prevent suppuration, to have perfect hemostasis, and to catch every blood-vessel as quickly as it bleeds, so as not to get the tissues stained and favor suppuration indirectly.

In regard to the after-treatment, in addition to the factor mentioned by Dr. Ochsner of the treatment of suppuration, it seems to me it is very essential to warn the patient, during the first three or four months after operation, to report immediately any attack of bronchitis or spasm of coughing that may occur, because this will frequently cause a relapse of the hernia.

Another factor is this: After the patient has gotten up (and I usually get my patients out of bed in three weeks), I fit him with a light, neatly fitting abdominal supporter, so that it will not inconvenience him, and he is instructed to wear it three or four months after operation.

Dr. Goldspohn mentioned a method of taking the internal oblique and suturing the posterior aspect to Poupart's ligament. This operation was proposed by Dr. Andrews, of Chicago, it being a modification of Bassini's operation. Dr. Andrews has done nearly three hundred operations by this method, and those connected with the same hospital have operated on fully a hundred or more cases without a single recurrence.

DR. WILLIAM J. MAYO, of Rochester, Minn.—The essayist has so fully expressed my own views in regard to the question of hernia that I do not care to say very much about operative procedures. In the beginning of his paper he stated that the most unfortunate feature in regard to the production of a relapse or recurrence was the introduction of scar tissue, largely by means of infection. It has seemed to me, particularly with the beginner, that these wounds are over-prepared. It is seldom we operate upon a case of strangulated hernia and get suppuration, because the cases are emergency cases; they are prepared on the table, and the wounds are not over-prepared. We should remember that there are bacteria in the deeper layers of the skin which we can not remove either by poulticing or by the application of antiseptic dressings; that the normal resistance which exists between the skin and its micro-organisms is greatly impaired by injudicious scrubbing, and that by means of friction with drugs, by the application of poultices, by early shaving twenty-four hours before, we only get rid of a little of the infection, and we often greatly interfere with prompt wound healing. It has been my experience, and that of others, that if these wounds are not over-prepared, and the parts are not shaved so long beforehand, and the skin is not bruised, there is not likely to be suppuration. Treat the skin kindly.

One other question was brought up by Dr. Goldspohn in reference to umbilical hernia. He spoke of bringing the muscles together in the median line. We must remember that below the umbilicus the recti muscles are nearly in apposition, but they diverge at that point varying from one half to three quarters of an inch. In adipose subjects the recti muscles may be clear off to the side, so that it may be impossible, in cases of large umbilical hernia, to bring these tissues together after the manner referred to by Dr. Goldspohn.

Another point: Is it necessary to keep these patients so long in bed after operation? I am allowing my patients to get up earlier and earlier. I am getting my hernia patients up in two weeks. If they are reasonably careful afterward, that is long enough for them to remain in bed.

DR. OCHSNER (closing the discussion).—I am obliged to the gentlemen for their discussion. Regarding the suture material, I would say that it is perfectly possible to prepare absorbable suture material that is aseptic. It is likewise perfectly possible to keep this suture material aseptic during the operation and to insert it in a wound and have it in place in an aseptic condition.

In answer to Dr. Eisendrath's question, I would say that I am in the habit of using chromicized catgut, which will stand for twenty days. This catgut is made aseptic first, then treated with chromic acid, and then preserved for an indefinite period of time in a solution of one part of iodoform, five parts of ether, and fourteen parts of alcohol, so that the material is not only aseptic, but it is very mildly antiseptic. In other words, if on account of slight tension, or of tying a ligature too tightly, or if on account of a little unexpected edema, I should obtain a slight amount of pressure necrosis, and some micro-organisms should by accident have gotten into the wound, the catgut is sufficiently antiseptic to overcome this difficulty. Right here I wish to say also, in connection with what Dr. Mayo has said, that I believe that these micro-organisms, the staphylococcus albus, which lives in the skin, follow the little necrotic tissue along the stitches which have been tied too tightly, and that this frequently is the cause of infection, and the precaution Dr. Mayo has mentioned should be recognized.

Regarding the tension to which Dr. Goldspohn has referred, I would say that before I learned to perform the operation that Dr. Mayo has described in umbilical hernia, I had the same difficulty. Gerster, of New York City, has described the same method that Dr. Goldspohn has described to-day. Both independently have brought out this point of tension sutures, and I made use of it at their suggestion. But when we use the method of Dr. Mayo we do not need tension sutures, because there is shortening of the distance between the sternum and the pubes at the age at which umbilical hernia occurs. In youth umbilical hernia invariably closes, with very few exceptions, spontaneously, but as the patient gets older it does not do so. In those cases in which we find hernia the distance between the sternum and pubes is decreased, so that if we follow the suggestion of closing the hernial canal from above downward, the suggestion Dr. Mayo has made, then there is no tension. It is surprising how easy it is. I was amazed to find that in large herniæ I required no tension sutures. Recurrences after the Mayo method are extremely rare, and the results are good.

XL. SUTURE OF THE ABDOMINAL WALL.

By CHARLES DAVISON, M. D.,
CHICAGO, ILL.

In suture of the abdominal wall after laparotomy, the ideal method of approximation is that of layer-to-layer apposition, uniting peritoneum to peritoneum, fascia to fascia, and skin to skin by independent planes of suture.

The ideal suture material is one that can be rendered sterile by boiling in water, that will remain sterile while in the tissues, and that will cease to exist in the tissues when healing is complete and its function has been accomplished.

These indications are not fulfilled by absorbable sutures of which catgut is the type, for the reason that this material is of animal origin, already infected with germs, the sterilization of which is difficult and uncertain and can not be accomplished by prolonged boiling in water without disintegration of the suture. Absorbable sutures eventually break down and pulpify, liberating any imprisoned germs and making a line of culture material, a nidus for pyogenic germs, either local in the catgut or brought to it by the blood-current. Many times late infection of a wound, after primary union has occurred, is due to this action of catgut.

Permanent buried sutures, the type of which is the twisted silver wire, are not the ideal sutures. After healing has occurred and their function has ceased, they become foreign bodies, and either are encysted in the tissues or are surrounded by granulation tissue and are gradually extruded from the tissues months or years after the operation.

I wish to present the method of closure of abdominal sections that I am using in routine work.

The wounds are closed by suturing each layer with a continuous silkworm-gut suture, the ends of which are left out at the angles of the wound, to be removed by traction when

healing is complete. The suture in the strongest layer is tied in position at each end in the layer with knots that can be unlocked by traction on the exposed ends when the stitch is to be removed. The closure of the peritoneum in a median laparotomy is illustrated by Fig. 1. The edges of the peritoneum are caught with forceps and held up away from the intestines by an assistant, and the peritoneum is closed by a continuous herring-bone suture of silkworm-gut.

When the opening in the peritoneum is closed the suture is shirred up, to take up all of the slack and to lessen the length of the wound, and the ends are left hanging out of the angles of the wound. The silkworm-gut is kinked in such a manner that it binds itself in the peritoneum and does not slip or pull apart, but by the end of a week, when the suture is removed, the elasticity of the silkworm-gut has made the suture perfectly straight and has brought the perforations in the peritoneum into a straight line and has made a track around the stitch by pressure necrosis so that it is very easy to remove by traction. In removing this suture the patient relaxes the abdominal wall by elevation of the thighs and shoulders; one end of the stitch is cut short, the other end is grasped in an artery forceps protected by a bit of gauze, and wound up close to the skin and traction is made on the forceps like the handle to a corkscrew.

For identification at removal this suture may be colored black with silver nitrate or blue with an alcoholic solution of methylene blue, or the ends knotted to corrrespond.

The closure of the linea alba in a median laparotomy is illustrated by Fig. 2. This is the strong layer of the abdominal wall, and if the tissues are fastened securely there can be no spreading of the wound. For this suture coarse selected Spanish silkworm-gut thirteen inches long, without flaw or defect, is used.

A small reverse bow-knot (diagram of which tied and loose is shown in Fig. 3) is tied four or five inches from the end of the strand; the edges of the fascia are caught up with

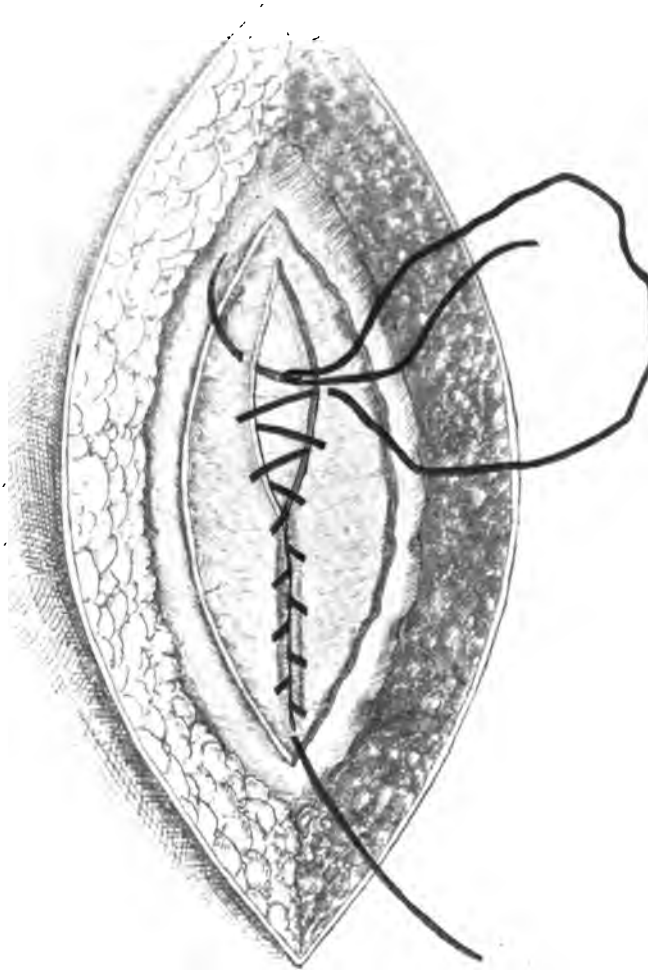

FIG. 1.—Suture of peritoneum.

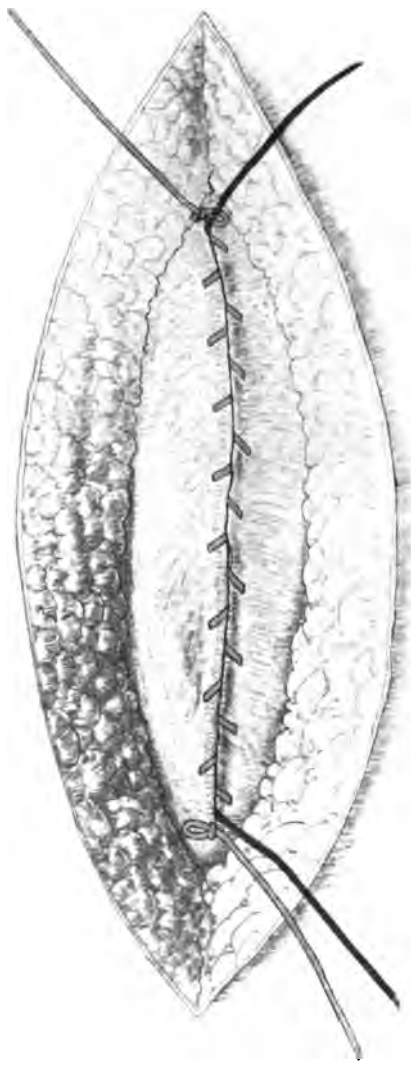

FIG. 2.—Suture of linea alba tied in position.

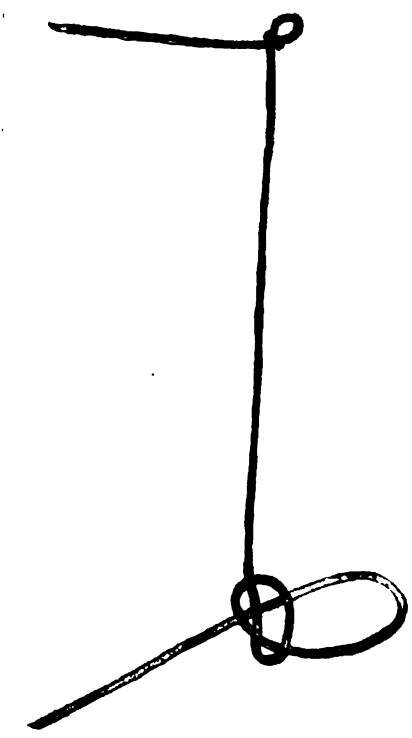

FIG. 3.—Diagram of knot.

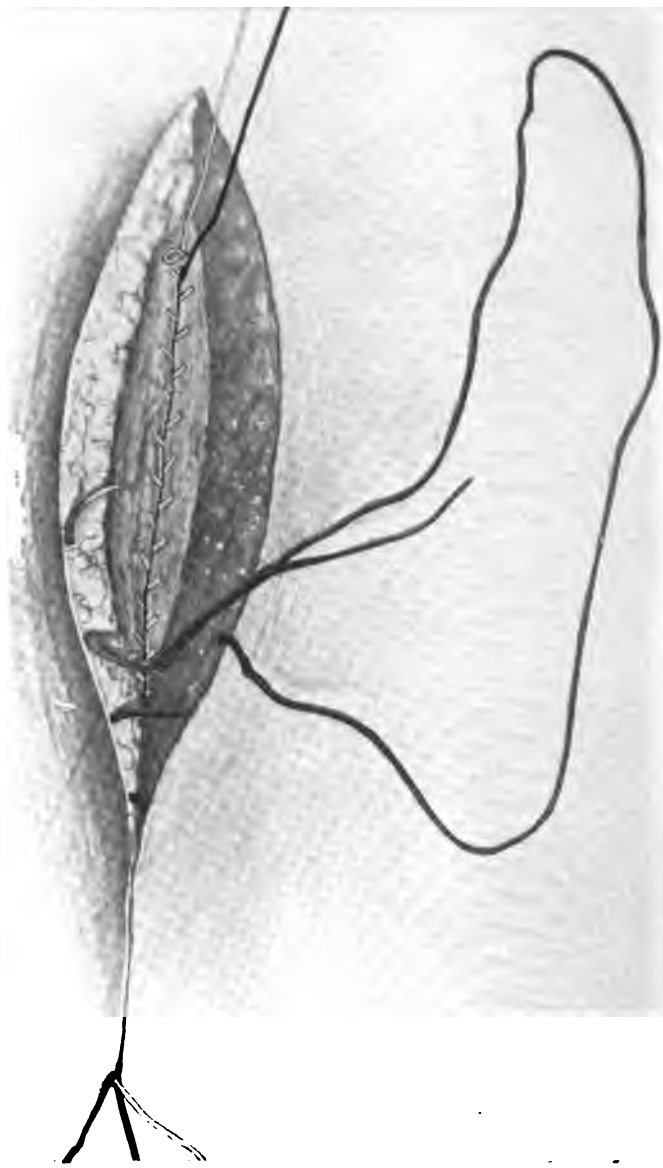

FIG. 4.—Suture of superficial layer.

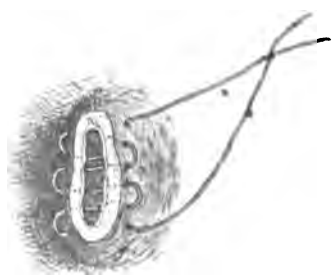

FIG. 5.—Suture of the sac.

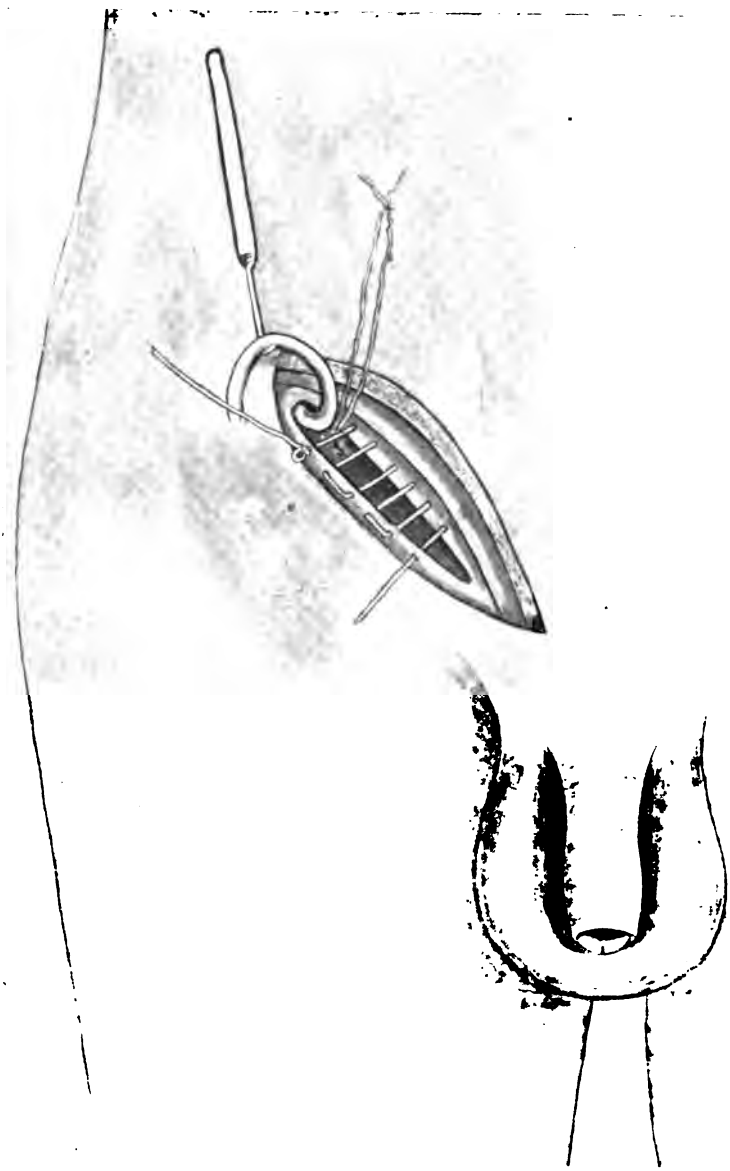

FIG. 6.—Basting suture uniting Poupart's ligament to the conjoined tendon in the imbricating operation for hernia.

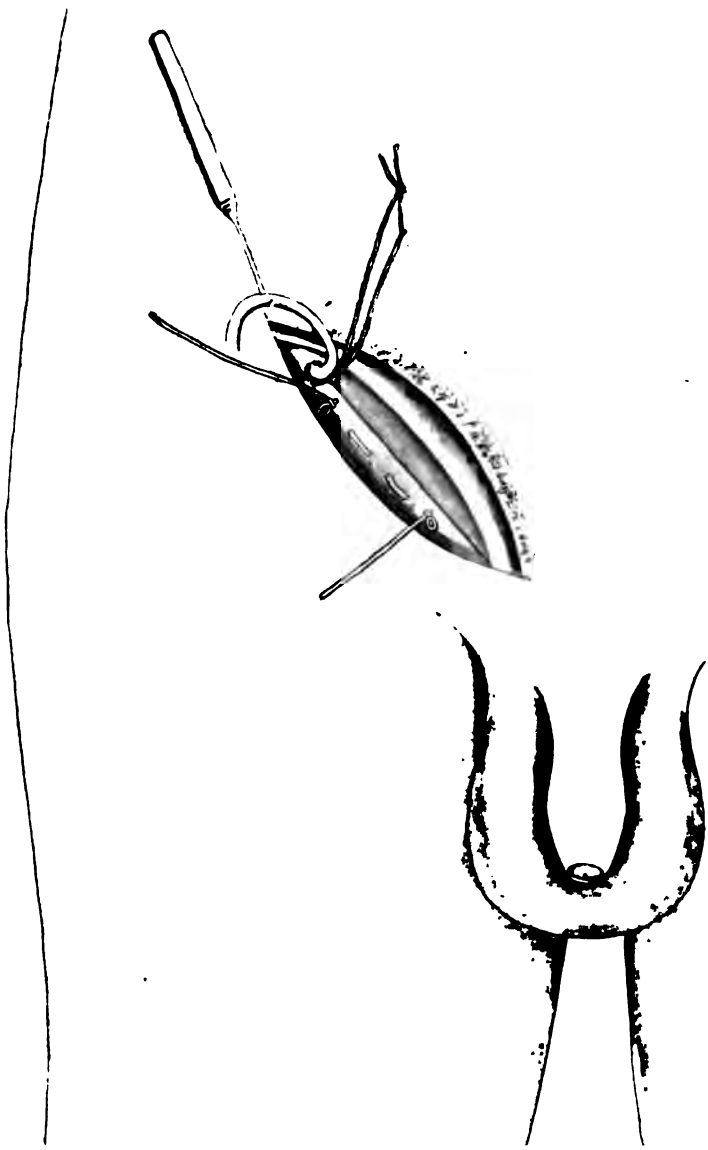

FIG. 7.—Basting suture uniting Poupart's ligament to conjoined tendon, tied in position.

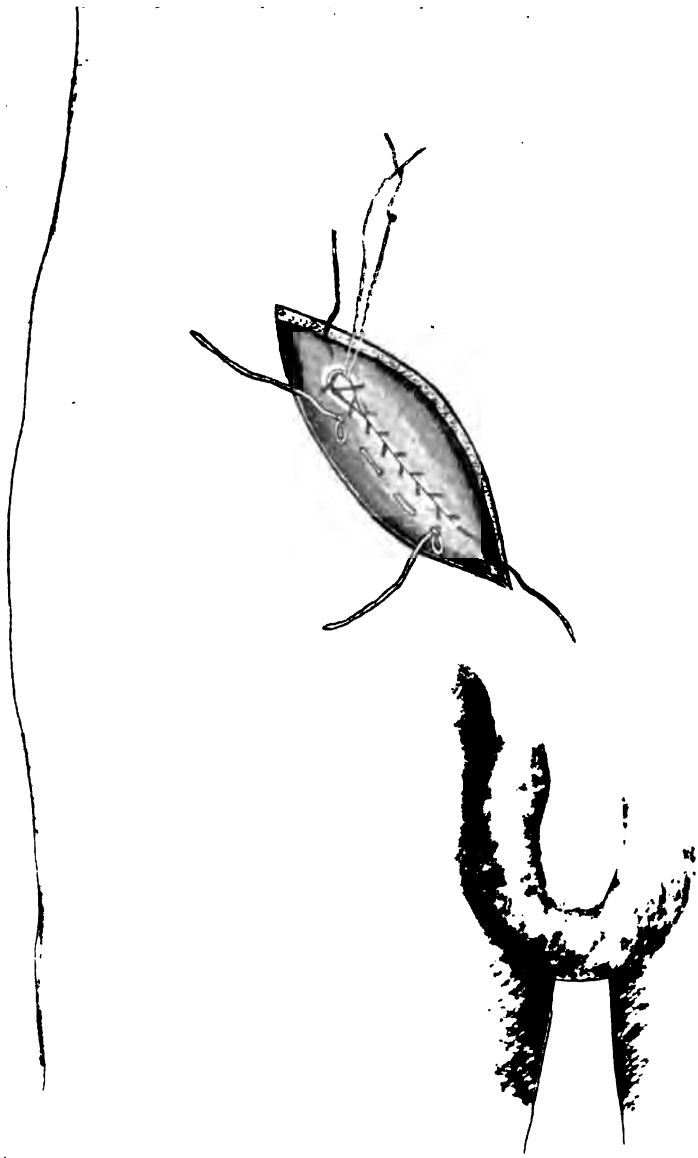

FIG. 8.—Suture of fascia of external oblique muscle to Poupart's ligament over the cord by continuous herring-bone suture.

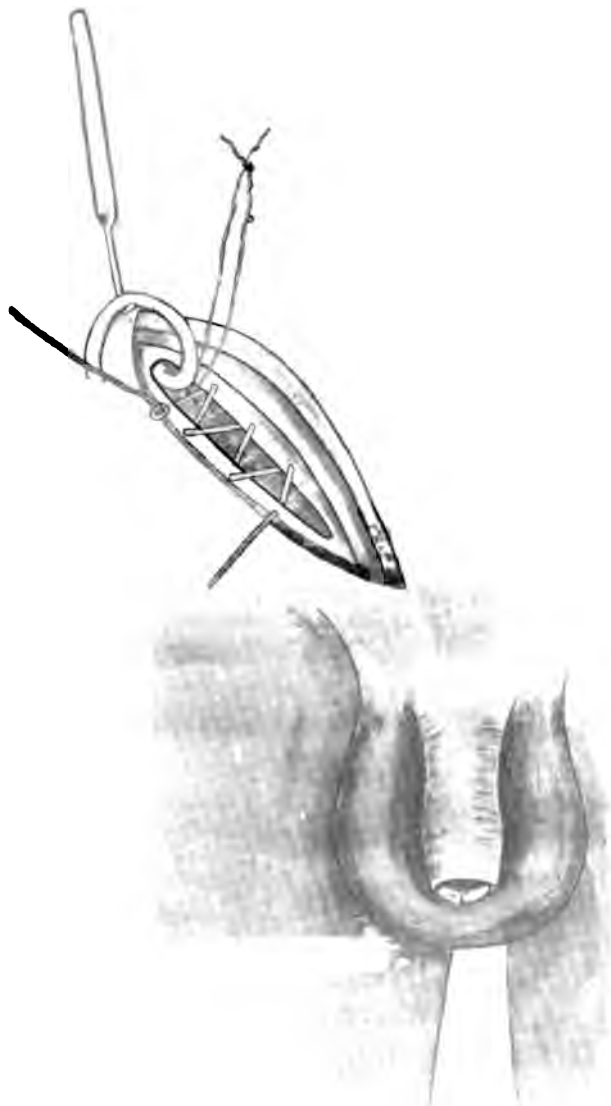

FIG. 9.—Suture of Poupart's ligament to conjoined tendon by continuous herring-bone suture, producing edge-to-edge apposition as in Bassini's operation.

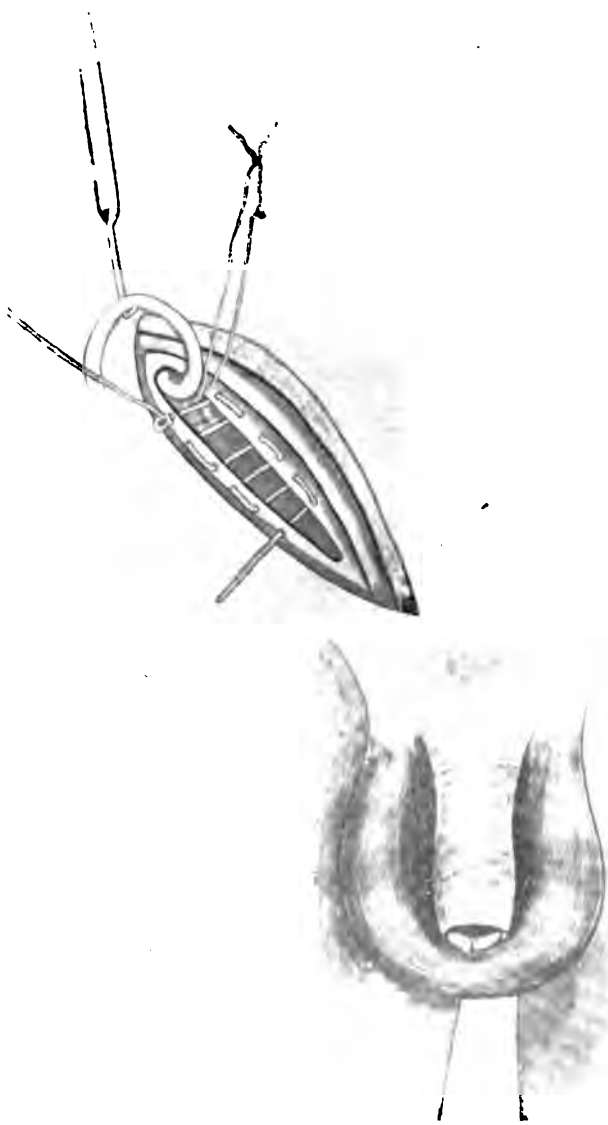

FIG. 10.—Suture of Poupart's ligament to conjoined tendon by continuous mattress suture, producing the same apposition of tissue as in Halstead's operation.

forceps and held up by an assistant. The suture is introduced in a firm place in the fascia back from the edge of the wound and drawn tightly up to the knot and the wound is closed by the continuous herring-bone suture. At the last stich the suture is shirred up tightly, grasped by a smooth-pointed dissecting forceps at its exit from the fascia and another reverse bow-knot tied below the point of the forceps.

With practice this can be tied without a particle of slack being left in the suture. It can be tied in this manner as closely as in the ordinary method of tying a continuous suture. This layer being securely fastened takes all of the tension from the other layers. The ends are allowed to hang out at the angles of the wound. This suture is removed in two or more weeks. Simultaneous traction on the free ends unties the knots when the suture is removed, in the same manner as the peritoneal suture.

The skin is closed by the Halstead subcuticular stitch (Fig. 4) of silkworm-gut colored red for identification by alcoholic solution of carbo-fuchsin.

These sutures act as capillary drains from each layer. If there are bleeding points which pressure or torsion do not control they may be constricted by loops of the nearest suture without making a knot.

This method of suture can be used in appendectomy or any laparotomy in which there is no provision for drainage and in which the incision is in a straight line. It can also be applied to any of the standard operations for the radical cure of inguinal hernia.

The sac is closed by a continuous mattress suture (Fig. 5) of silkworm-gut, the ends shirred up making a sort of double purse-string suture. The lower end is marked by a knot for identification, and the ends are tied together and brought out of the upper angle of the wound. This suture is removed at the end of a week by pulling up the lower strand and cutting it short and then drawing out the upper fragments.

In the operation for hernia in which Poupart's ligament is imbricated over the conjoined tendon behind the cord, which I usually do, a simple continuous basting stitch (Fig. 6), tied at either end, is used. The suture with the knot tied at one end is passed through Poupart's ligament about one centimeter from its free edge, close to the cord, penetrating the ligament from the outside and emerging from its internal surface; the suture is next carried across the wound behind the cord and penetrates the conjoined tendon at the same level and distance from its edge, emerging on the peritoneal side of the conjoined tendon. The suture is then returned through the same tissues in the opposite direction one centimeter below the first perforation, completing one unit of the continuous basting or sailor stitch, which when completed is tied in position with the knot shown in detail in Fig. 3, and the free ends are allowed to extend out at the angles of the wound. (Fig. 7.) This is the strong layer, and when sutured firmly takes the tension from the other layers.

The fascia of the external oblique muscle is sutured to the shelving edge of Poupart's ligament over the cord with a continuous herring-bone stitch (Fig. 8) of black or blue silkworm-gut, the ends projecting from the angles of the wound without being tied. The skin layer is closed by the subcuticular suture of red silkworm-gut already described. (Fig. 4.)

The suturing of Poupart's ligament to the conjoined tendon by edge-to-edge apposition, as in the typical Bassini operation, can be accomplished by a continuous herring-bone suture (Fig. 9) of silkworm-gut tied at each end in the ligament with the reverse bow-knot.

The suturing of Poupart's ligament to the conjoined tendon by a continuous mattress suture (Fig. 10) of silkworm-gut, tied at either end of the ligament, produces the same apposition of tissues as in the Halstead operation with the buried interrupted mattress suture of silver wire.

In general, the advantages of this method of suture are:

1. Certainty that all suture or ligature material placed in the wound has been made sterile by boiling in water.

2. Accurate layer approximation of tissue.

3. Removal of the buried sutures when healing is complete.

4. Capillary drainage from each layer.

5. Safety of intestines from injury during the application of the sutures.

6. Rapidity of application.

7. Minimum line of irritation on the peritoneal surface and consequent adhesion to the viscera.

8. Slight scar in the skin, there being no perforation of the skin by sutures.

9. All of the advantages of a permanent buried suture without the danger of future irritation and extrusion.

10. The advantages of an absorbable suture without the danger of sepsis from the suture and without producing a nidus for septic germs from the blood-current during absorption.

In seven months following January 3, 1901, the date of the initial use of the knot, I have used this method in eleven median laparotomies, in eight appendectomies, in four ventral herniotomies, and in seventeen inguinal herniotomies, all of my abdominal operations that were closed without drainage, and obtained sterile primary union in every case, the most recent of these cases being now six weeks from operation and safe from suppuration.

The claim of originality which I maintain is not in the use of a longitudinal suture, but in the tightly and securely tying of a buried longitudinal suture which can be easily removed when healing is complete.

DISCUSSION.

DR. D. N. EISENDRATH, of Chicago, Ill.—Mr. President: This is undoubtedly an ideal suture. There are only two points that occur to me in thinking over this suture. In the first place, there would be considerable dead space left between the different layers, the peritoneal and the aponeurotic layers of the linea alba proper, and also between the linea alba and the skin or subcutaneous tissue. If there was the least active infection it would favor its spread considerably more than the ordinary abdominal suture.

Another point that occurred to me is with reference to the getting out of the knot at the upper end of the wound, which Dr. Davison has shown. It would seem probable that in the fifty cases he speaks of one would have occasion some time to open up the wound and look for the knot, and it would seem difficult to bring up the surface of the skin sufficiently to cut it off beyond the reach of the knife.

DR. W. A. SPITZLEY, of Detroit, Mich.—During the four years in which I was with my former chief, Dr. Nancrede, of the University of Michigan, I did considerable experimental work in testing ligature material, and what I shall have to say will pertain largely to the author's statement of the impossibility of sterilizing catgut, or rather the unreliability of it. It is true that many methods which have been employed for the sterilization of catgut are unsatisfactory. For five years we have used a method of sterilizing catgut the efficiency of which we never had the least reason to doubt; one of the many modified methods of sterilization with cumol. From a number of experiments which I conducted once or twice each year in testing catgut, I never failed to find it sterile; it is a material that can be made free of organisms.

Another point: The use of silkworm-gut for close approximation, which conduces to primary union of tissues, is objectionable because of the stiffness, the wire-like condition of new silkworm-gut. If it is new, unless it is used immediately after it comes out the sterilizer, it is stiff, and it is very hard to get satisfactory and perfect approximation of the surfaces. It is likely to break; and while catgut is open to the same objection, the splitting off of silkworm-gut is well known.

Another point occurred to me in connection with the use of silkworm-gut in closing off the hernial sac, especially in the form of operation to which I have been used, the Bassini or slightly modified Bassini operation, where the hernial sac is placed in the abdominal cavity. In the author's method, where the removable suture is used, the stump of the

hernial sac can scarcely be returned to the abdominal cavity, and there is just so much liability to recurrence of the hernia; with the absorbable ligature, on the other hand, the stump can be returned. In the employment of ligature material which must be removed, it seems to me we run the risk not only of having a possible infection carried down to the sac which is connected with the peritoneal cavity, but also it is unsafe for us to leave it *in situ* long enough to accomplish firm closure of the sac, a thing which is highly desirable.

With reference to the possibility of increased liability of infection occurring as the result of the absorptive process of any material which is absorbed, I question very much if it is greater than the liability when we have foreign material in the tissues. Active absorption is not accompanied by any more congestion and stasis than is the case when we have foreign material in the tissues.

DR. DAVISON (closing the discussion).—As to the question of dead space referred to by Dr. Eisendrath, when the wound is dressed I put a firm pad over the line of suture, which effectually obviates any dead space, with a dressing on top of that and a binder.

I do not attempt to cut the knot off. One knot is put in in this manner (illustrating), another one on the other side. I can pull as much as I like that way; it gets tighter. These knots are buried, but the ends hang out at the angles of the wound. I do not go into the wound, and do not open it.

As to the question of getting the suture out, I experimented more than a year with the longitudinal suture, with silkworm-gut, before I put in the knot. In my early efforts I found it a difficult thing to let the suture out, but I made up my mind that it was due to several factors, and among them poor silkworm-gut, imperfect strands of silkworm-gut, careless pulling on the ends, position of patient, etc. I use selected Spanish silkworm-gut. It is easy to sterilize, and after coming out of the sterilizer it is soft.

With reference to the sterilization of catgut by means of cumol, I have had some experience in regard to cumol sterilized by the Kuy-Scherer method at the Cook County Hospital. They have had the sterilizing apparatus there for a number of years, and it is practically discarded by many of the surgeons connected with that institution. Most of the catgut used there now is prepared by the formalin method.

I am quite enthusiastic about this new suture, and I believe it is a suture of merit, one that will stand the test of time, and that has come to stay.

XLI. APPENDICITIS, WITH REPORT OF ONE HUNDRED CONSECUTIVE CASES OPERATED.

By WILLIAM J. GILLETTE, M. D.,
Toledo, O.

Of these one hundred cases I was compelled to operate upon seventy in the presence of pus, and a number had all the symptoms of general peritonitis. The deaths all occurred in the pus cases—not one of those operated, non-purulent, died, and this fact I wish here to emphasize. The importance of operating early for appendicitis, before pus has formed, before general sepsis has occurred or a general peritonitis has developed, has not, until lately, been fully appreciated by the profession of Toledo and the surrounding country; and it is for this reason, in large measure, that my earlier death-rate was much higher than it is at present. I had nineteen deaths in the first one hundred operations, and only three in the last thirty-eight operated during the past eleven months (two of these were done by Dr. H. L. Green, my assistant)—a reduction in death-rate from nineteen to eight per cent. In the first one hundred operations seventy per cent. were pus cases; while in the last thirty-eight there were but 54 per cent. In the first one hundred operations the appendix was removed in sixty-five, or sixty-five per cent.; in the last thirty-eight it was removed in thirty-two, or eighty-five per cent.

Though greater experience and a much better operative technique have no doubt helped in this great reduction of death-rate, yet in my opinion the most important influence has been the fact that the profession here has at last, though slowly, yet certainly, come to realize, and are acting upon the realization, that early operations are by far safest, and that the interests of patients are best conserved by them. Even the laity is making this demand for early operation;

and it is not infrequent that the patient, on being informed he has appendicitis, is the first to suggest immediate operation, and so it happens that now surgeons here are operating; fewer and fewer cases have been allowed to go on until desperate in character.

The profession of New York, Philadelphia, Boston, etc., as well as in some of our neighboring cities, under the leadership of Joseph Price, Deaver, Murphy, Morris, and others of the masters in abdominal surgery, earlier grasped this idea than we, and in acting upon it have saved multitudes of lives that otherwise would have been lost.

I am aware, however, that the general practitioner is not always at fault in the matter of delay, for often he is not called in till late in the disease. A case in point: On the day I am writing this I operated for my friend, Dr. R. M. Eccles, of Blissfield, Mich., who was called only yesterday to see a little eleven-year-old girl, who had been sick about one week with appendicitis. He found her with a distended abdomen, a pulse-rate of one hundred and twenty-six, and practically a normal temperature. He at once sent for me, and I operated, evacuating a large quantity of foul-smelling pus from a cavity that seemed completely walled off. The appendix not appearing, I broke this wall and came into another with a like quantity of vile-smelling pus, and from there I broke into two others in the pelvis. I evacuated these and left the external incision wide open for more complete drainage. The appendix I found perforated and gangrenous, lying high above the pus accumulations. It was removed with much difficulty. Though this case, when first seen by Dr. Eccles, was far advanced, the girl at no time had complained of much pain, and had not gone to bed until the day before he was called in.

The diagnosis of appendicitis should usually, in its acute stage, be made without difficulty, though further on in this paper I mention some cases which would, I am sure, defy the powers of the best diagnostician. The cases which can

not be correctly diagnosed before operation are very unusual, but I am continually meeting appendicitis incorrectly diagnosed. I am sure nearly one fourth of those I am called to operate in the acute stage are at first supposed to be intestinal obstruction; and often when I say to the gentleman calling me that the case is one of appendicitis and not intestinal obstruction, his eyes open wide in astonishment. The picture of appendicitis is widely different from that of intestinal obstruction, and it would seem to me that this error should be seldom made, if a few of the points of differential diagnosis be kept in mind. With intestinal obstruction there is never, to begin with, rise of temperature, and unless from the obstruction there happens to be gangrene of the intestine, the pulse does not early become frequent. The abdomen does not usually have the same contour that is seen in peritonitis, and unless the patient be very fat, separate rolls of distended intestine in active peristalsis can be made out, which is not true in inflammatory conditions; and then there is always the stercoraceous vomitus, about which there can be no mistake. In appendicitis it matters not how much the patient vomits, its character is not stercoraceous; it does not come from the lower portion of the intestine and colon, as is usual in obstruction.

I am sure I have operated a number of cases of appendicitis in which the primary attack was treated as typhoid fever. Many cases dying at the end of a week, or often earlier, of supposed typhoid fever are in fact appendicitis. I have in mind, while writing this, a case which one of the leading physicians of this city reported about three years since before the Toledo Medical Association, the title of whose paper was something like this: "Have we a new disease in the community?" and took as a basis for his argument the case of a patient who had been sick with many of the symptoms of typhoid fever, but did not run a perfectly typical course, and the doctor assumed, by reason of this, we had with us some new and strange disease. This patient had subsequently

about four attacks of the same trouble, and about two years after the attack of illness upon which the learned paper was based I removed a diseased appendix embedded in adhesions which, without any doubt, were largely formed at the time of the first illness.

In this connection it will probably not be out of place to mention the more prominent symptoms and indications of appendicitis; though they are, of course, entirely familiar to all present, yet to freshen the mind occasionally is of value. Usually the disease is ushered in with a sudden pain in the abdomen, frequently following a hearty meal, and the pain is often attributed to this. The pain may be referred to the epigastric space, sometimes it seems greatest about the umbilicus, and it may be located by the patient on the left side rather than the right; later, however, it is referred to McBurney's point, or near it. The formation of pus is usually indicated by a chill. When called to see a case with pain in the abdomen, it matters not where the patient apparently locates it, if pressure over McBurney's point indicates that here is the place of greatest tenderness, it will, with few exceptions, be appendicitis. Later a dull note at this point will indicate the trouble to a certainty. Given a male with severe pain in the abdomen, not due to trauma, the chances are you have an appendicitis. In the female, if you can rule out inflammations of the uterine adnexa, the chances are you have an appendicitis. Of course we must keep in mind when making a diagnosis that there are such diseases as gall-stone colic, intestinal colic, perforations of the intestines, etc. So far as treatment is concerned, there is but one, and that surgical. I have been a long time coming to this conclusion, but the wider my experience with appendicitis, and with a better knowledge of its treacherous nature, I am convinced that no one is safe with an appendix that has ever been the subject of an inflammation. Dr. Ochsner, of Chicago, has for some time back advocated that the cases which when first seen are far advanced should not be operated until the acute symp-

toms have passed, but food stopped and opium given, and nature allowed to do what she can. It would not be becoming in me to criticise Dr. Ochsner, with his vast experience, he having operated more than one thousand; but when the abdomen is filled with pus it seems reasonable to my mind that it should be let out, even if nothing more be done. It is a very old principle in surgery, "given pus, evacuate it." Though believing that nearly all cases stand a better chance of recovery if operated when first seen, yet there are occasionally those in which it is no doubt best to follow a plan something like that of Dr. Ochsner's, as the following will illustrate, though I can not bring myself to the giving of opium in any case:

D. G., a day laborer, referred to Robinwood Hospital, of Toledo, O., March 6, 1900, by Dr. C. L. Cass, with the following history: One week prior to admission had severe pain in the right side of abdomen, vomiting, and obstipation. The abdomen gradually distended. On admission to the hospital the pulse was 110, temperature subnormal, abdomen greatly distended and painful. Cathartics had been given freely for nearly a week with no result. The patient's condition seemed desperate. Ten grains of calomel were at once administered in one-grain doses hourly, food stopped and applications made to abdomen. In about ten hours the bowels acted, the pulse began to decline, together with the distention, and after six days the pulse and temperature had returned to nearly normal; a well-defined mass appeared on the right side, to which tenderness was confined, and now operation was done. The appendix was found entirely sloughed off, and a large fecal concretion in the pus cavity back of the cecum. The patient made an uninterrupted recovery with the exception of a fecal fistula, which, however, closed spontaneously in a short time. Had I operated on his admission to the hospital, as I was urged to do by friends, the result would no doubt have been fatal.

Regarding the first hundred operated, the ages of the patients, grouped in decades, were as follows:

At the age of 10 years	2
From the age of 10-20	32
From the age of 20-30	34
From the age of 30-40	15
From the age of 40-50	15
From the age of 50 and upwards	2

(One of these a lady of 72.)

They show the greatest number of attacks, 66 per cent., to have occurred between the ages of ten and twenty. Dr. Haemig, of Zurich, reports 65 per cent. of his cases as occurring between these ages, and says that this ratio agrees with that of Prof. Kroenline's clinic. He accounts for it "by reason of the fact that during this time the lumen has not as yet undergone the retrogressive changes so common, that finally produce complete obliteration of it."

Enteroliths were found in about one half the severest cases, and gangrenous appendices were removed in twenty-eight. Fecal fistuæ appeared in eight; all, however, closed spontaneously in a short time.

Most statistics show that appendicitis occurs in a majority of males, the proportion being about two to one. In this series, however, there were forty-nine males and fifty-one females, divided as follows: Thirty-nine men, forty-two women, and nineteen children, of whom ten were boys and nine girls.

Although Drs. Price, Deaver, Murphy, and other great leaders in surgery insist that the appendix be removed practically in all cases at the primary operation, and though in their skilled hands this may be done with safety, yet I am sure the average operator may well hesitate to follow their example, and especially when he remembers that after the acute stage is passed the appendix can with safety be removed. When such men as the above-mentioned recommend the universal removal of the appendix at the primary operation,

one of less experience might easily become shaken in his opinion that this is not the best course to follow as routine practice; and it is with satisfaction that the writer sees that many of the great European continental operators, though formerly advocating the more radical procedure, as Professors Kroenline, Sonnenburg, Haemig, Bruns, and others, have again become more conservative, and do not always remove the appendix at the first operation. It has been my custom to remove it in the presence of pus, unless by so doing the danger of infecting the general cavity seemed great.

Of the thirty-one cases out of the first one hundred operated, in which I contented myself with simply opening, evacuating, and draining, eight died, and of those that recovered four have had a recurrence, of which one died following operation two years after the primary attack. I am sure had I removed the appendix in all the thirty-one cases at the primary operation more than this one death would have resulted as a consequence; though with greater skill and experience I am very sure a much larger proportion of appendices can, with equal operative safety, be removed. My work for the past eleven months, where as stated above, of the thirty-eight cases operated, with but three deaths, the appendix was removed in thirty-two, illustrates this fact, though of this series I had to deal with pus in but twenty cases.

The time of operation from onset of attack and results, again considering the first one hundred operated, are as follows:

One operated in 24 hours—recovered.
Two operated in 40 hours—2 recovered.
Three operated in 48 hours—2 recovered, 1 died.
Eleven operated in 3 days—8 recovered, 3 died.
Twenty-four operated in one week—17 recovered, 7 died.
Four operated in 10 days—2 recovered, 2 died.
Nine operated in 2 weeks—8 recovered, 1 died.
One operated in 3 months—1 recovered.
Twenty-five operated between attacks—24 recovered, 1 died.

Of the remaining twenty cases the record of time of operation with reference to the attack is wanting, and of these there were four deaths. One occurred at the end of two weeks after operation from pneumonia; and one a month after, of multiple abscess of the liver. This last I am sure might have been saved had I used drainage. It was operated forty-eight hours after the onset of the attack. I found a perforated appendix and a small amount of pus formation. The appendix was easily removed, and the pus washed out with peroxide of hydrogen, and then salt solution. The operation had gone so well, and the appearance of the parts was so satisfactory at its close, that I thought drainage unnecessary, and closed the abdomen completely. The patient seemed to do well for a week, the incision healing by primary union. At this time, however, he had a chill, followed by high temperature and pain over the liver, but no evidence of any trouble at the seat of the operation, nor was there at any time. Repeated chills continued for three weeks, the temperature rising to 106, and the pulse to 140 and over, when he died. Post-mortem revealed multiple abscess of the liver as a cause of death. Infection had, without doubt, been carried to the liver from the appendiceal abscess. I have not the slightest doubt that had I used drainage the case would have recovered.

The difficulty of sometimes making accurate diagnosis of appendicitis is well illustrated by the following:

September 16th last I was called in consultation with Dr. C. S. Miller, of Toledo, O., to see a married lady, just recovering from a six or eight weeks' attack of typhoid fever, and who had suddenly developed appendicitis, an unusually large inflammatory mass appearing in the right iliac fossa. An incision into it revealed the fact that it was made up not only of appendiceal pus, which was evacuated and the cavity drained, but a displaced kidney, together with the gall-bladder, from which I removed seven large stones. The patient was very ill for a time, but eventually recovered. Her con-

dition did not warrant prolonged operation, so the kidney was not replaced, and yet remains in its abnormal position, but without discomfort to the patient.

Case 2d was referred to me by Dr. Hendershot, of Tiffin, O., in December last. This patient had had, a short time prior, her right ovary and tube removed by reason of severe abdominal pain from which she suffered.

The pain was referred by her to the left side. No relief followed from the operation, and as her condition was evidently serious, I reopened the abdomen, and found the appendix, together with the cecum and a large portion of the ascending colon, displaced to the left side; it, together with the appendix, was inflamed and adherent. I removed the appendix and replaced the cecum and colon in their normal position, expecting them to remain; but a week after, pain in the old location recurred, of so severe a nature I again opened the abdomen, and found the cecum and colon, as I anticipated, in their former abnormal position. Their coats now showed so much evidence of interference with the circulation that gangrene seemed imminent. I resected a portion of the ileum together with the cecum, and a part of the ascending colon, using a Murphy button. The patient made an uninterrupted recovery, and has since remained free from pain, and has resumed her occupation as a nurse.

That an accurate diagnosis could have been made by any one prior to operation in either of these cases I do not believe.

Very frequently appendicitis is taken for right-sided inflammation of the ovary and tube; and not infrequently the appendix is involved in a right-sided inflammation of the ovary and tube. In two cases it has been my fortune to find the appendix adherent to the sac of extra-uterine pregnancies; and in both, the symptoms were so markedly those of appendicitis that I was in doubt as to the real nature of the trouble till the abdomen was opened. In one, the symptoms were so clearly those of appendicitis that I began the operation as for appendicitis.

The pathological lesions found do not always correspond to the severity of the symptoms, or *vice versa*. I have frequently observed extensive pathological lesions, and the severity of the constitutional disturbance in no wise in proportion to them; and on the other hand severe constitutional symptoms, and very little pathological change to be found. Cases in point are the following:

J. W. M., aged 19, schoolboy, referred to me by Dr. Wm. Cherry, of Toledo, O. Three days prior to admission to Robinwood Hospital began to have intense pain over the abdomen, vomiting, chill, and obstipation. After twelve hours the pain became localizedin the right side. The pulse was rapid and the temperature high. Operation was done immediately upon admission to hospital. The appendix was found without perforation, but the tip of it dipping into a small quantity of pus, probably not more than half a drachm. The appendix was easily removed, the pus cavity washed out with peroxide of hydrogen and salt solution, and drainage instituted. Judging from the small amount of pathology found, a very favorable prognosis was given; but instead of the symptoms improving, they continued to grow worse, until he died two days later of a diffuse peritonitis. On the other hand, extensive pathology is often found with symptoms not severe enough to indicate its extent, as illustrated by the following case, referred to me by Dr. Seth Beckwith, of Toledo, O.:

A schoolgirl, aged 14, forty hours prior to operation was taken with sudden pain in the epigastrium, pulse and temperature began to increase, with slight abdominal distention, and tenderness about McBurney's point. From the constitutional disturbance present, though the pulse was 110 and the temperature slightly elevated, the general appearance of the child was not bad, and the symptoms were entirely disproportionate to the pathological lesion found later, at operation. A suppurative appendicitis existed, in which the appendix, together with a portion of the adjacent cecum, the

size of a silver quarter, had sloughed away. This gangrenous mass was removed, the opening in the cecum sewn up, and the abdominal cavity cleansed as well as possible and drained with iodoform gauze. Forty-eight hours after operation the pulse was extremely rapid and the outlook bad; but under the influence of a cathartic dose of calomel the symptoms began to mend, and she finally made a good recovery.

In addition to the one hundred cases of appendicitis reported, during the time over which they were operated I made four operations for acute intestinal obstruction, due to bands of adhesions caused by former attacks of appendicitis. One of these was upon a man at the age of eighty-two. In one the band had occluded a large portion of the ileum, causing gangrene of it. Both died, but two others made good recoveries, though at time of operation they were desperately ill.

I have found the leucocyte count in exceptional cases of great value in making diagnosis of the presence of pus, though when a septic peritonitis exists, general in character, it is misleading.

The use of peroxide of hydrogen in large quantities for the purpose of throwing pus out of the abdominal cavity, as advocated by Dr. Robert Morris, followed by a thorough irrigation with salt solution, has been to me of the greatest value.

DISCUSSION.

Dr. J. HENRY CARSTENS, of Detroit, Mich.—Mr. President: This paper brings up the whole subject of appendicitis, which is a very intricate one indeed. There are several points in the paper with which I must disagree, and a few of them that I have my doubts about.

As to the question of conservatism in appendicitis, I think the doctor is mistaken; from what I can read in European literature gradually the pendulum is swinging to the other side, and in England and Germany, where operations for this disease were much discouraged years ago, I see they are now beginning to strongly advocate early operation.

Although I sometimes myself hesitate, I must say that the more I see of it the more I am convinced that as soon as a diagnosis is made we ought to operate. I think the doctor's records will show that his best results were obtained when the operation was performed early. The more you subject patients to the action of pus, the more you destroy the power of resistance they have got. That seems to be as plain as anything can be. We have a wall of demarcation that will limit the pus or abscess in some cases, but in others we have not. If the wall is torn, as it often is, by certain motions of the patient, we have a fresh absorption and more sepsis, and it goes on day after day, and we are sometimes called in when there has been adhesion of the bowels in three or four different directions, and doubtless ulceration of the intestine. I recall one case with four distinct openings in the bowel at different points. These openings were patched up. There was an appendicular abscess and ulceration had taken place. I closed these openings when I operated, and it was a formidable operation. If I had operated on the second day the chances of the patient would have been better. We sometimes have good luck, and have a large series of operations with a small mortality. Then we have three or four cases that die one after the other. Ten years ago my mortality from this disease was a great deal larger than it is now. I thought then I could operate as well as anybody else. I think to-day I can operate better than I did ten years ago. That is natural. There is one thing which I think was the cause of my mortality in my earlier work, and that was the free use of peroxide of hydrogen with which to wash and flush the pus out of the cavity. Peroxide of hydrogen will run all over the cavity, and there is great liability of it carrying some septic germs to some uninfected spot, and the result will be a secondary abscess somewhere else. If you wash it out, it is the same thing. I have gradually come to believe, as a great many others have, that the less water we put in there the better. Keep it dry. Don't use a particle of peroxide of hydrogen. If I operate on a case of abscess and the latter is walled off, and the bowels are absolutely walled in, I do not use any peroxide of hydrogen. Why? Because it does not kill any germs. I might possibly wash some of them out, but I can remove them just as well by means of a sponge, and I keep everything dry. When the abscess is not walled off, if I open the general peritoneal cavity I keep the intestines dry, because I know that by having them dry there will be quick adhesion of the intestines around this cavity where the appendix has been. It guards against the danger of infection. If I put in a lot of

water I liquefy the secretion of the peritoneal cavity and prevent the plastic lymph which is thrown out from causing agglutination. I admit that a great deal of septic material can be taken care of by the peritoneum. I strongly advocate the dry treatment of these cases and the non-use of peroxide of hydrogen, although I used a good deal of it at one time. I believe now that the only correct way of treating appendicitis is to remove the appendix when you make the diagnosis.

DR. A. M. HAYDEN, of Evansville, Ind.—In regard to fluids in the abdominal cavity, the more fluid that is put in this cavity in any operation for abscess or the removal of pus the greater the danger of sepsis. I never put a drop of water in the abdominal cavity, I do not care how large the abscess may be. I wall it off as well as I can, and clean out the cavity with a sponge. We can not wash septic matter out of the abdominal cavity with water or any solution. We can clean it out with aseptic or sterilized sponges better than we can by any other means. In large abscess cavities I wall them off with gauze and clean them out thoroughly with sponges. I frequently close the abdomen without drainage. Where I have pus cavities, I have cleaned them out with gauze. It is absolutely impossible to clean the abdominal cavity of foreign matter by washing it out. We dilute the septic matter and wash it into parts of the cavity that have not been previously infected, thus spreading infection instead of limiting it.

DR. A. J. OCHSNER, of Chicago, Ill.—I have discussed one feature of appendicitis so frequently that I am almost ashamed to refer to it again. I am sure that it is right, and I am glad to see so many members of the Society have followed the plan since I spoke of it on a previous occasion before this body. Many of them have written to me and have confirmed my views. Appendicitis patients die because the infection does not stay in the original area of infection. If the infection remained in the appendix or about the appendix these patients would not die. If Dr. Carstens sees his patients before the first thirty-six hours, or shortly after, then he can very easily arrange it so that these microbes will never get anywhere else, because he will remove the appendix and that ends it. We know that cases operated during the first forty-eight hours get well, but those who are operated on days following that show a high mortality. The reason that these patients die is because the infection is not confined to the appendix. How does infection spread to other portions of the abdominal cavity? It spreads either through the operation or through the action of the small intestine. The

peristaltic motion of the small intestine carries this infection to the other portions of the abdominal cavity. If we can prevent peristaltic motion then the infection will not spread. It does not matter how severe the infection may be it will be limited to the appendix, where it was originally, because the omentum will surround the appendix and keep it there. I have operated on more than a thousand cases of appendicitis and am consequently in position to speak from my own observations. During the last three years my mortality in perforating and gangrenous appendicitis has been five per cent., probably a fraction less than that, while Deaver's has been seventeen per cent., and Deaver's statistics are the best of all operators who operate as soon as they make a diagnosis, simply because they help to distribute these micro-organisms over the cavity. How can we prevent the infection from spreading? We can limit it by putting nothing into the stomach, by washing out whatever is in the stomach, by using neither cathartics nor food by the stomach. A mistake made by Dr. Gillette in his treatment was in giving cathartics. If I remember rightly, he spoke about giving calomel in one case. Calomel would naturally thrash the microbes around the abdominal cavity, and cathartics will kill a great many cases in that way. In several hundred cases (I do not remember the exact number which I have seen early) there was no general peritonitis associated with gangrenous or perforative appendicitis, and, as I have said before, my mortality was a fraction less than five per cent. If you can convert the acute cases into chronic ones then you have practically no mortality. In over four hundred chronic cases of appendicitis I had a mortality of less than one fourth per cent. The point is this: Neither food nor cathartics should be given to any patient suffering from acute appendicitis, no matter what form of treatment may be contemplated, because in this way the greatest danger, that of disseminating the micro-organisms throughout the peritoneal cavity by means of the peristaltic motion of the small intestine, can be eliminated. I am certain that when this form of treatment has once been generally adopted the mortality in perforative or gangrenous appendicitis will fall below five per cent.

DR. WILLIAM J. MAYO, of Rochester, Minn.—I wish to endorse fully the position taken by Dr. Ochsner in cases of advancing peritonitis. If we can see our cases of appendicitis in the first forty-eight hours, then the position taken by Dr. Carstens is logical and operations are followed by the very best of results. But there is a very considerable class of cases in which the infectious material has escaped from the

appendix; it occupies a considerable portion of the iliac fossa, and in some of these cases nature is scarcely able to prevent the spread of the infection, and these cases when operated upon are attended with considerable mortality. Dr. Ochsner taught me a lesson along the lines indicated by him three or four years ago, and I can only say that I have reduced my mortality more than two thirds in this particular class of cases. I wish to endorse the position of Dr. Carstens in regard to the dry treatment of these wounds.

DR. GILLETTE (closing the discussion).—I seldom see the cases that are referred to me until very late in the disease. Dr. Carstens misunderstood me a little. I adopted what Morris advocated, and I do not understand him to advocate the introduction of peroxide of hydrogen in those cases that are walled off, but in those where the general peritoneal cavity seems to be invaded by infection. When we encounter those cases, it seems to me that thorough irrigation first with peroxide of hydrogen, then with salt solution, is a good thing. I have seen lives saved by this measure that otherwise I am sure would have been sacrificed. I believe there is something in physicking these patients, otherwise I should not have given calomel in one of the cases mentioned in my paper.

MISSISSIPPI VALLEY MEDICAL ASSOCIATION.

MINUTES.

Official Report of the Proceedings of the Twenty-seventh Annual Meeting, held at Put-in-Bay Island, Ohio, September 12, 13, and 14, 1901.

SEPTEMBER 12TH—FIRST GENERAL SESSION.

The Association convened in the Assembly Hall of Hotel Victory, and was called to order by the Chairman of the Committee of Arrangements, Dr. J. C. Culbertson, of Cincinnati, Ohio, at 10.05 a.m.

Prayer was offered by the Rev. C. H. Tucker, of the Reformed Episcopal Church, Put-in-Bay, O.

After divine blessing was invoked, Dr. Culbertson made the following brief report as Chairman of the Committee of Arrangements:

REPORT OF THE COMMITTEE OF ARRANGEMENTS.

Any delegates or other persons belonging to the Mississippi Valley Medical Association, official or otherwise, including the ladies and exhibitors, who wear the button of the Association, can go to the other end of the car line and have at their disposal small boats for fishing or other pleasures.

To-morrow morning (Friday) the ladies are invited to go aboard the Ogontz steamer, when they will be conveyed around the islands during the forenoon, getting back sufficiently early for lunch. The trip is a delightful and beautiful one to make.

This evening we will have the annual dinner of the Association. It is our wish that every one be prompt to enter the dining-room at 7.30 o'clock. The same insignia (the button) will entitle all to admission to this dinner.

Dr. Chapman, of Ohio, will now deliver a brief address of welcome.

ADDRESS OF WELCOME BY DR. WILLIAM C. CHAPMAN, OF TOLEDO, OHIO.

Ladies and Gentlemen: It is always a pleasant task to welcome one's friends to a feast such as we expect to have at this meeting. Away from the noise of cities and the bustle and stir, some of us have gathered together to enjoy ourselves. There are only two physicians on this island, and so it falls to my lot to represent the State of Ohio in welcoming the members of the Mississippi Valley Medical Association to our borders. We learn a good deal from one another at these annual meetings; they are not held solely for dry science, but there is a good deal more about the personalities of doctors and of shaking hands with them than many of us think. We come together to make acquaintances, to renew old ones, and to more fully understand one another. These meetings carry us back to our college days when we shake hands with the professors of our colleges and the teachers, and we know a good deal more by shaking hands with them. We have come together on this island for recreation and study. This island is historic. On this bay, in front of the hotel, nine miles out, part of the American navy and part of the English navy had a battle, and the heroes on both sides, three Englishmen and three American officers, are now buried under monuments of cannon-balls, which you saw as you came here. I hope this morning you will get together, become acquainted with one another, and learn to know each other, for it is not all science that we meet for. There is something in brotherhood at these meetings, and if there is anything else that we are brought together for, it is to bind the East to the West and the North to the South. To the ladies I wish to say, I wish every man had brought his wife here. I think that they ought to come. Are not they a part of the profession of medicine? Have not they worked

as hard as we have to make us what we are? Have they not gone through the struggles to maintain our reputations as much as we have? I am glad the Chairman of the Committee of Arrangements, Dr. Culbertson, has invited the ladies to everything that we do. Let us be a band of brothers for the next two or three days, and we will always be better for it. (Applause.)

Dr. Culbertson then introduced the President of the Association, Dr. A. H. Cordier, of Kansas City, Missouri.

The President stated that he had not much to say at this time, but the members of the Association would hear more from him when he delivered his address.

The report of the Secretary, by Dr. Henry Enos Tuley of Louisville, was called for, and read as follows:

Report of the Secretary.

Mr. President and Members of the Mississippi Valley Medical Association gathered in your twenty-seventh annual session:

It is my pleasure to submit for your consideration another annual report. We have already submitted to the Executive Committee a number of communications, which must properly be considered by them before given you for final adoption or rejection, and your time will not be consumed by their recital.

We would call your attention especially to the facility with which the Transactions of the Asheville meeting were published and submitted to the members, to the excellence of the volume and its typographical make-up. We also feel that the program of the present meeting is worthy of remark because of the prominence of the essayists, the excellent choice of topics, the splendid synopses and the typographical excellence of the book.

We feel that the meeting has been well advertised both through the press and by communications addressed directly

to the members of the profession. It has been our endeavor to get a preliminary and a final program into the hands of each of the members some days before the meeting.

We have had brought to our attention the death of the following members of the Association: Dr. B. F. Swafford, the Association's first President, and whose likeness is contained in the program; Dr. E. F. Woodruff, of Columbus, O., and Dr. Marie J. Mergler, of Chicago. We would suggest the reference of these names to the Necrology Committee for a report before the volume of Transactions is ready for publication.

The Association is to be congratulated upon the selection of the annual orators, Drs. Frank Billings and Reginald Sayre; the acceptance by these gentlemen of the invitation of your President to make these addresses being an evidence again this year, as has been the case for a number of years past, of the esteem in which the Association is held by the profession generally.

Twenty-six resignations have been tendered by delinquent members during the year, when bills were presented for back dues. Nearly $600.00 has been collected during the past year from those in arrears, an achievement worthy of commendation. Because of the number of members who join at the place of meeting, when it is in a city, only out of courtesy, we carry a large list on our books of 'dead timber,' so to speak, and a considerable sum is wasted in trying to collect the dues for the next two years, when their names are dropped by the Executive Committee if they are still in arrears. The Association is also put to the expense of providing volumes of Transactions for them, hoping they will pay, and a large number are left undistributed. This is an additional cost also. It is to be hoped that some means may be devised whereby we can ascertain the intentions of one making application for membership. We have inserted the word "permanent" in the application blank this year looking to that end.

We hope that the Association will early pass appropriate resolutions touching upon the dastardly crime against our nation's Chief Executive, and urging suitable legal proceedings which will rid the country of all anarchists.

We wish you a most prosperous and enjoyable session.

Respectfully submitted.

HENRY ENOS TULEY,

Secretary.

On motion of Dr. Dudley S. Reynolds the report was accepted and filed.

Dr. H. O. Walker.—Owing to the few members present this morning, I move that the Sections unite as one, and that the Address of the President be deferred until this afternoon. Carried.

The President.—We will now listen to the report of the Treasurer, Dr. Dudley S. Reynolds, of Louisville, Ky.

Dr. Reynolds read his report, as follows:

REPORT OF THE TREASURER.

Mr. President: SEPTEMBER 12, 1901.

Your Treasurer has the honor to report that the balance in the treasury, October 8, 1900, was.....	$41 39	
Received from the Secretary, October 11, 1900.....	471 00	
Received from Secretary since last meeting.....	631 50	
The Publishing Committee, consisting of the Secretary, Treasurer, and Dr. L. S. McMurtry, borrowed from the Western Bank, December 29, 1900, to meet the necessary expenses of publishing the Transactions, the sum of.....	350 00	
And subsequently, on May 31, 1901, the sum of.....	125 00	
Total receipts.....	$1,618 89	
Your Treasurer has disbursed, as per vouchers submitted		$1,453 12
Due Western Bank.....		125 00
Cash on hand.....		40 77
Total		$1,618 89
Due in bank.....		$125 00
Cash in treasury.....		40 77
Deficit		$84 23

There are no unpaid bills known to the Treasurer.

This very satisfactory showing is, in the main, due to the unceasing efforts of your most efficient Secretary, all of which is most respectfully submitted.

DUDLEY S. REYNOLDS,
Treasurer.

Approved by Auditing Committee.

H. O. WALKER.

On motion of Dr. Thomas Hunt Stucky the report was accepted and filed.

Dr. H. O. Walker.—I move that this Association send the following telegram:

Resolved, That the Mississippi Valley Medical Association, in session assembled, tenders to Matthew D. Mann and his competent confrères its congratulations on the prompt and masterly manner in which they have cared for the President, William McKinley.

Seconded and unanimously adopted.

The next order was the Report of the Committee on Publication, which was read by Dr. Tuley, as follows:

REPORT OF THE COMMITTEE ON PUBLICATION.

Mr. President and Members of the M. V. M. A.:

Your Publication Committee begs leave to submit the following brief report:

We feel the volume of Transactions for the Asheville meeting needs no apology at our hands. It was issued with promptness and is typographically correct.

It was our pleasure to submit for correction all manuscript of the discussion to those who participated, thus making doubly sure that the speaker was in each instance properly reported. Our thanks are due to those receiving this copy for their prompt attention to it.

The following bids were received, the work being awarded to the Donohue & Henneberry Co., of Chicago:

Donohue & Henneberry, Chicago	$500 00
Courier-Journal Job Printing Co., Louisville	680 00
Skeen, Aitken & Co	520 00
W. B. Conkey & Co	644 00
Wm. J. Dornan, Philadelphia, Pa	616 00
R. R. Donnelly & Sons Co., Chicago	575 00
Woodward & Tiernan, St. Louis	800 00
F. C. Nunemacher, Louisville	732 00
Geo. G. Fetter, Louisville	588 00

Your Committee deemed it advisable to go into bank for enough money to pay the publisher's bill, as there was not enough in the treasury to meet it, and there is still a little owing of this sum, as shown by the Treasurer's report.

All of which is respectfully submitted.

HENRY ENOS TULEY, *Chairman.*
DUDLEY S. REYNOLDS.
LEWIS S. MCMURTRY.

On motion of Dr. Thomas Hunt Stucky, of Louisville, the report was accepted and filed.

PRESENTATION OF GOLD PIN TO THE PRESIDENT.

Dr. Thomas Hunt Stucky, of Louisville.—Mr. President: The duty has been assigned to me of presenting to you a gold pin on behalf of the Mississippi Valley Medical Association. I beg to assure you, sir, that it gives me great pleasure to present this to you. I take pleasure in pinning it upon your coat. The words engraved on the pin are, "Put-in-Bay, Ohio, Sept. 12, 13, and 14, 1901; A. H. Cordier, President, Twenty-eighth Annual Meeting."

President Cordier, in accepting the pin, said: This is certainly a surprise to me, I assure you, and I can not find words to fitly express my appreciation of this gift, coming as it does from this Society, which I think has no equal in the world so far as its scientific work is concerned. It may be

smaller in the number of attendants, but it is beyond doubt the best working Society I have ever attended in the United States, and I am sure those who are in the habit of attending these meetings will fully agree with me. I thank you very much for this present. (Applause.)

On motion the Association then adjourned until 2.00 p.m.

SEPTEMBER 12TH—SECOND GENERAL SESSION.

The Association reassembled at 2 p.m., and was called to order by the President.

Dr. C. F. McGahan, of Aiken, S. C., took the Chair, and President Cordier delivered the Presidential Address. He selected for his subject: "Nephrolithiasis."

At the conclusion of the President's Address, on motion the General Session adjourned, and the scientific work was divided into two sections, medical and surgical.

SEPTEMBER 13TH—THIRD GENERAL SESSION.

The Association met at 9 a.m., with the President in the Chair.

The Secretary read several letters and telegrams from absentees, in which they expressed their wishes for a successful meeting, and regretted their absence.

The President announced the following as the Nominating Committee:

NOMINATING COMMITTEE.

MICHIGAN,	H. O. WALKER.	S. CAROLINA, .	DAVIS FURMAN.
MASSACHUSETTS,	C. M. COBB.	PENNSYLVANIA,	JOHN BATTEN.
ILLINOIS, -	TRUMAN W. BROPHY.	MISSOURI, -	EUGENE CARBAUGH.
KENTUCKY,	THOS. H. STUCKY.	SOUTH DAKOTA,	H. HOLMGREN.
INDIANA, -	WM. N. WISHARD.	MARYLAND, -	HORACE SIMMONS.
NEW YORK,	I. N. LOVE.	IOWA, - - -	T. P. STANTON.
ARKANSAS,	S. P. COLLINGS.	FLORIDA, -	PORTON H. BENNETT.
OHIO, - -	C. B. PARKER.	VERMONT, -	H. D. HOLTON.
TEXAS, -	J. W. HUNTER.	CONNECTICUT,	T. D. CROTHERS.
TENNESSEE,	DUNCAN EVE.	N. CAROLINA, .	E. B. GLENN.

The President then introduced Dr. Frank Billings, of Chicago, who delivered the Address in Medicine. He selected for his subject, "What are the Qualifications Necessary for Success in the Practice of Medicine?"

At the conclusion of the address Dr. A. P. Buchman, of Fort Wayne, Ind., moved that the thanks of the Association be extended to Dr. Billings for his able and instructive address. Carried.

Dr. E. B. Smith, of Detroit, offered the following:

Resolved, That the Mississippi Valley Medical Association, in session assembled, sends sympathies with best wishes for the recovery of President McKinley.

On motion, the resolution was adopted, and the Secretary instructed to send this to the President's private secretary.

There being no further business to come before the General Session at this time, on motion the general meeting adjourned for the purpose of resuming Section work.

September 13th—Fourth General Session.

The Association was called to order at 8.30 p.m. by the President.

The following papers were read and illustrated by stereopticon views:

1. "Surgery of the Palate," by Dr. Truman W. Brophy, of Chicago, Ill.

2. "The Appendix," by Dr. N. Stone Scott, of Cleveland, O.

3. "Some Causes of Ignored Syphilis, and their Remedies: Clinical Examples," by Dr. M. L. Heidingsfeld, of Cincinnati, O.

4. "Hematology," by Dr. L. H. Warner, of New York City.

On motion, the Association adjourned until 9 a.m. Saturday.

SEPTEMBER 14TH—FIFTH GENERAL SESSION.

The Association met at 10 a.m., and was called to order by the President.

The President introduced Dr. Reginald A. Sayre, of New York City, who delivered the Address in Surgery.

Dr. H. O. Walker moved that the thanks of the Association be extended to Dr. Sayre for his valuable address. Carried.

The President: We will now listen to the report of the Nominating Committee, which will be read by the Chairman, Dr. H. O. Walker.

REPORT OF THE NOMINATING COMMITTEE.

Mr. President: Your Nominating Committee begs leave to make the following report of officers for the ensuing year:

President, Dr. S. B. Collings, of Hot Springs, Ark.

First Vice-President, Dr. J. C. Culbertson, of Cincinnati, O.

Second Vice-President, Dr. Paul Paquin, of Asheville, N. C.

Secretary, Dr. Henry Enos Tuley, of Louisville, Ky.

Treasurer, Dr. Thomas Hunt Stucky, of Louisville, Ky.

Place of Meeting, Kansas City, Mo.

Chairman of the Committee of Arrangements, Dr. A. H. Cordier, Kansas City, Mo.

On motion, the report was adopted as read.

The President appointed Dr. H. O. Walker and Dr. I. N. Love to conduct the President-elect to the platform.

The retiring President introduced the President-elect in a brief but appropriate speech.

Dr. Collings, in accepting the Presidency, said: You will not expect a long speech from me, as we have a good deal of work yet to do. I want to say, however, that I heartily appreciate the honor conferred upon me in being elected to

preside over this scientific body. I hope I will have the endorsement and coöperation of every member of the Association. We will all work together and try to make the Kansas City meeting the banner meeting of the Association. Gentlemen, I thank you. (Applause.)

Dr. Andrew Timberman, of Columbus, O., moved, in view of the death of President McKinley, that all papers on the program whose authors were not present be read by title; that the meeting adjourn immediately, and that a committee of three be appointed to draft appropriate resolutions as coming from the Mississippi Valley Medical Association. Seconded and carried.

Dr. H. O. Walker then moved that the papers that had not been read, but whose authors were present, be read by title and referred to the Committee on Publication. Carried.

The President appointed Drs. Andrew Timberman, I. N. Love, and H. O. Walker to draft suitable resolutions on the death of President McKinley.

This committee subsequently reported as follows:

"Our President is dead. Our President, who accomplished the unification of our country; the abolition of sectional lines; the expansion which made us a world power, his last public utterance being in favor of peace, international reciprocity and sympathy, has been removed by the enemies of society.

"We are overwhelmed with sorrow and personal grief for the death of the greatest of the world's rulers; for one who, from the standpoint of statesmanship, political foresight, sympathy with all the people, morality, the sweetest features of personal character and home life, appealed to the appreciation of and affections of every citizen.

"A professional sorrow and disappointment taking the place of a hope that had inspired us from the first day the nation's calamity overwhelmed us.

"Joining in the personal grief and bereavement from which every true and loyal American citizen is this day

suffering, we, the members of the Mississippi Valley Medical Association, in our twenty-seventh annual meeting assembled, do postpone the further presentation and consideration of special papers, in token of the love and respect with which we shall ever cherish the memory of our martyred President, William McKinley."

(Signed) ANDREW TIMBERMAN, M. D.,
H. O. WALKER, M. D.,
I. N. LOVE, M. D.,
Committee."

On motion, the Association then adjourned to meet in Kansas City, Mo., in 1902.

MINUTES OF THE MEDICAL SECTION.

First Day, Thursday, September 12th.

Dr. Charles F. McGahan, Vice-President, in the chair.

Dr. Carolus M. Cobb, Boston, Mass., read a paper entitled: "A Discussion of the Morbid Conditions of the Upper Respiratory Tract Resulting from the Infections Diseases."

The paper was discussed by Drs. L. H. Warner, W. F. Barclay, J. H. Coulter, Emil Amberg, John North, and A. E. Sterne.

Dr. John M. Batten, Downingtown, Pa., read a paper on "Acute Intestinal Auto-Infection."

The paper was discussed by Drs. T. H. Stucky, I. N. Love, A. P. Buchman, Wm. Bailey, George D. Kahlo, John North, W. F. Barclay, G. W. McCaskey, C. S. Chamberlain, C. H. Hughes, and A. E. Sterne.

Dr. John North, Toledo, Ohio, read a paper on "Asthma."

The paper was discussed by Drs. L. H. Warner, J. Holinger, J. W. Hunter, John M. Batten, C. S. Chamberlain, Porton H. Bennett, W. J. Stewart, and J. S. Miller.

Second Day, Friday, September 13th.

Dr. A. D. Murphey, Cincinnati, Ohio, read a paper on "Hay Fever."

This paper was discussed by Drs. John North, Carolus M. Cobb, G. W. McCaskey, J. Holinger, and Harold N. Moyer.

Dr. Henry D. Holton, Brattleboro, Vt., read a paper on "Scientific Aids to Diagnosis."

The paper was discussed by Drs. T. D. Crothers, A. E. Sterne, H. N. Moyer, and G. W. McCaskey.

Dr. Albert A. Sterne, Indianapolis, Ind., read a paper on "Dentists' Neck: A Hitherto Undescribed Neurosis."

The paper was discussed by Drs. T. W. Brophy, H. N. Moyer, G. W. McCaskey, F. Savary Pearce, and Emil Amberg.

Dr. Frank Parsons Norbury, Jacksonville, Ill., read a paper on "The Bed Treatment of the Insane."

The paper was discussed by Drs. John B. Learned, C. B. Burr, and A. E. Sterne.

Dr. Harold N. Moyer, Chicago, Ill., read a paper on "Puerperal Insanity."

The paper was discussed by Drs. W. F. Barclay, A. E. Sterne, F. P. Norbury, and G. W. McCaskey.

Dr. Jokichi Takamine, New York City, read a paper on "Adrenalin, the Active Principle of the Suprarenal Gland: Its Mode of Preparation."

The paper was discussed by Drs. C. M. Cobb, John North, G. W. McCaskey, and C. F. McGahan.

Dr. B. T. Whitmore, New York City, read a paper on "Aboriginal American (Indian) Contributions to Therapeutics." No discussion.

Dr. Geo. D. Kahlo, Indianapolis, Ind., read a paper on "The Dyspeptic's Diet." No discussion.

Dr. George F. Butler, Alma, Mich., read a paper on "The Personal Element of Error in Therapeutics."

The paper was discussed by Drs. C. B. Burr and L. H. Warner.

Dr. F. Savary Pearce, Philadelphia, Pa., read a paper on "The Acquirement of Nervous Health."

The paper was discussed by Drs. F. P. Norbury and C. H. Hughes.

Dr. Paul Paquin, Asheville, N. C., took the chair during the following symposium on Tuberculosis.

Dr. C. F. McGahan, Aiken, S. C., read a paper on "The Treatment of Tuberculosis at Home."

Dr. H. C. Howard, Champaign, Ill., read a paper on the "Treatment of Tuberculosis with Fomaldehyde and its Salts."

The papers were discussed by Drs. C. H. Hughes, Emil Amberg, H. B. Weaver, B. T. Whitmore, McFarland, C. F. McGahan, Paul Paquin, Howard, and C. H. Hughes.

Dr. T. D. Crothers, Hartford, Conn., read a paper on "Some Obscure Injuries which Follow the First Toxic Action of Alcohol."

Dr. T. B. Greenley, Meadow Lawn, Ky., read a paper on "Some of the Evil Effects of the Use of Alcoholic Liquors."

The papers were discussed by Drs. G. W. H. Kemper, C. H. Hughes, Emil Amberg, and B. T. Whitmore.

Dr. Chas. M. Shepard, Brooklyn, N. Y., read a paper on "Auto-Intoxication and its Treatment." No discussion.

THIRD DAY, SATURDAY, SEPTEMBER 14TH.

In consequence of the death of President McKinley it was agreed that all the remaining papers on the program of which the authors were present should be read by title and referred to the Publication Committee. The list of these papers was as follows:

"The Pharmacologic Action of Drugs," by Dr. E. M. Houghton, Detroit, Mich.

"Science and Christian Science," by Dr. Paul Paquin, Asheville, N. C.

"Gastric Lavage: Its Use and Abuse," by Dr. Thos. Hunt Stucky, Louisville, Ky.

"The Oral Administration of Antitoxin," by Dr. Chas. T. McClintock, Detroit, Mich.

"Refined Antitoxins," by Dr. Joseph McFarland, Philadelphia, Pa.

"Anemias Secondary to Gastro-Intestinal Disease: With Report of Cases," by Dr. G. W. McCaskey, Fort Wayne, Ind.

"The Young Physician," by Emil Amberg, Detroit, Mich.

"Modern Methods of Treating Syphilis," by Dr. Eugene Carson Hay, Hot Springs, Ark.

MINUTES OF THE SURGICAL SECTION.

First Session.

The Section was called to order by President Cordier.

1. Dr. E. B. Smith, of Detroit, Mich., read a paper on "Fractures," which was discussed by Drs. Hughes, Hayden, Stewart, Thorn, Ochsner, Phelps, and the discussion closed by the essayist.

2. "Floating Liver: with Report of a Case," by Dr. J. Henry Carstens, of Detroit, Mich. Discussed by Drs. Hayden and MacDonald.

3. "A Preliminary Report on Sterilization of Rubber Gloves byFormaldehyde Gas, and the Use of Mild Antiseptics Inside the Gloves," by Dr. A. Goldspohn, of Chicago, Ill.

4. "Infection from the Bacillus Ærogenes Capsulatus, with Report of a Case," by Dr. Julius H. Jacobson, of Toledo, O. Discussed by Drs. Davison, Thorn, Tuckerman, and in closing by the essayist.

5. "Features Determining Permanency of Cure in Radical Operations for Hernia," by Dr. A. J. Ochsner, of Chicago, Ill. Discussed by Drs. Eve, Goldspohn, Eisendrath, Mayo, and the discussion closed by the essayist.

6. "The Severing of the Vas Deferii and its Relation to the Neuro-psychopathic Constitution," by Dr. H. C. Sharp, of Jeffersonville, Ind. Discussed by Dr. Ochsner, and in closing by the essayist.

On motion, the Section then adjourned.

Second Session.

7. "Varicose Veins and their Treatment," by Dr. J. Lively Johnson, of Louisville, Ky. Discussed by Drs. Walker, McGraw, Mayo, Phelps, Eisendrath, and Smith.

8. "Congenital Valvular Obstipation," by Dr. Thomas Charles Martin, of Cleveland, O.

9. "The Use and Limitations of the Elastic Ligature in Intestinal Surgery," by Dr. Theodore A. McGraw, of Detroit, Mich.

10. "Intestinal Resection," by Dr. H. O. Walker, of Detroit, Mich.

11. "The Surgical Features of Typhoid Fever and Dysentery," by Dr. Hal C. Wyman, of Detroit, Mich.

12. "Some Indications for Gastro-enterostomy," by Dr. Wm. J. Mayo, of Rochester, Minn.

These five papers were discussed jointly by Drs. Tuckerman, Ochsner, Carstens, Davison, Johnson, Phelps, MacDonald, Martin, McGraw, Cordier, and the discussion closed by the essayists.

Adjourned until 2 p.m.

THIRD SESSION.

13. "Tripartition in the Study of the Female Pelvis," by Dr. A. E. Gallant, of New York City.

14. "Tubercular Disease of the Spine; Lateral Curvature of the Spine, and the Proper Treatment of Each," by Dr. A. M. Phelps, of New York City. Discussed by Drs. MacDonald, Sayre, Eisendrath, and the discussion closed by the essayist.

15. "Report of One Hundred Cases Operated for Appendicitis," by Dr. Wm. J. Gillette, of Toledo, O. Discussed by Drs. Carstens, Hayden, Ochsner, Mayo, and the discussion closed by the essayist.

16. "Suture of the Abdominal Wall," by Dr. Charles Davison, of Chicago, Ill. Discussed by Drs. Eisendrath, Hayden, Spitzley, and the discussion closed by the author of the paper.

On motion, the Section adjourned until Saturday morning, 10 o'clock.

NECROLOGY.

Dr. Stell Davis, of Waelder, Texas, August 5, 1901.

Dr. Stell Davis was born at Adairesville, Ga., April 28, 1878, died at Waelder, Texas, at 6 p.m. Friday, August 2, 1901. His parents moved to Arkansas while he was young. He was educated at the Rally Hill Academy and the Yellville Male and Female College, Arkansas. Early in life he took up the study of medicine, practicing for a time as an undergraduate. He graduated from the University of Tennessee and the term of 1894–5 was valedictorian of his class. Post-graduate of the Chicago Polyclinic '99. He has since practiced in the Indian Territory and Texas, having located at Cistern six years ago, moving with his brother, Alex, to Waelder in February of this year and joining interests with his brother, Oscar, there. He leaves a wife and two children. He was married in April, 1895, at Sipe Springs, Texas, to Miss Rosa McKeehan.

Dr. Marie J. Mergler, May 18, 1901,

Aged 50 years, of pernicious anemia, after an illness of a year. Dr. Mergler was born in Mainstockheim, Bavaria, her parents moving to America when she was two years old, locating in Wheeling, Ill., her father, also a physician, practicing there and at Palatine, Ill. She received her early education at Cook County Normal School, State Normal School at Oswego, N. Y., and graduated from the Woman's Medical College of Chicago in 1879. She assisted Dr. William H. Byford in his operative work for several years. She was the first woman physician to compete successfully with the other Chicago medical graduates for appointment as interne of the Cook County Hospital at Dunning, Ill., the

commissioners failing to give her the appointment. She afterwards studied at Zurich, Switzerland, giving special attention to pathology and clinical medicine. Dr. Mergler began the practice of medicine in Chicago in 1881, doing general practice at first, then limiting her practice to obstetrics and gynecology.

In her alma mater she has held the positions of Lecturer on Materia Medica, Lecturer on Histology, on Materia Medica and Therapeutics, Clinical Instructor in Gynecology, and Adjunct Professor of Gynecology. After the death of Professor Byford in 1890, she was made Professor of Gynecology as his successor. From 1885 to 1899, she held the office of Secretary of the college. During her term of office she proved herself to be possessed of good executive ability and labored untiringly to advance the school.

She was in 1882 appointed an attending surgeon to the Cook County Hospital; in 1886 attending surgeon to the Woman's Hospital; in 1890 Gynecologist to Wesley Hospital; in 1895 Physician-in-Chief to Mary Thompson Hospital.

In 1889 she was appointed dean of the school by the trustees of the Northwestern University, a position she held at the time of her death.

ROSTER OF MEMBERS

Mississippi Valley Medical Association.

WM. C. ABALY,
Brown Block, Madison, Wis.
W. E. ALDERSON,
College Street, Russellville, Ky.
J. E. ALLABEN,
Masonic Temple, Rockford, Ill.
BEN A. ALLAN,
1968 Portland Ave., Louisville, Ky.
JOHN T. ALLEN,
Brownsville, Tenn.
EMIL AMBERG,
270 Woodward Ave., Detroit, Mich.
C. P. AMBLER,
4 Temple Court, Asheville, N. C.
JOHN C. AMIS,
Fort Smith, Ark.
CARL H. ANDERSEN,
100 State Street, Chicago, Ill.
J. M. AULD,
100 State Street, Chicago, Ill.
C. S. BACON,
426 Center Street, Chicago, Ill.
WM. BAILEY,
215 W. Broadway, Louisville, Ky.
H. L. BAIRD,
60 Patton Ave., Asheville, N. C.
A. J. BANKER,
723 Franklin Street, Columbus, Ind.
WM. F. BARCLAY,
1620 Fifth Avenue, Pittsburgh, Pa.
B. FRANK BARNES,
Hemlock, O.
C. W. BARRETT,
100 State Street, Chicago, Ill.
J. F. BARTON,
Shawneetown, Ill.
R. ALEXANDER BATE,
Second and Burnett, Louisville, Ky.
S. R. BATES,
Muldrow, Ind. Ter.
W. H. BATES,
50 East 64th St., New York, N. Y.
J. M. BATTEN,
Downingtown, Pa.
S. WESTRAY BATTLE,
13 Church Street, Asheville, N. C.
WM. L. BAUM,
103 State Street, Chicago, Ill.
EMORY H. BAYLEY,
Lake City, Minn.
CHAS. H. BEARD,
34 Washington, Chicago, Ill.
L. W. BEARDSLEY,
211 Olivia Building, St. Louis, Mo.
BROOKS F. BEEBE,
408 Broadway, Cincinnati, O.
J. S. BECK,
34 W. Fifth St., Dayton, O.
ARTHUR J. BEHRENDT,
93 Fowler Street, Chicago, Ill.
PORTON BENNETT,
Daytona, Fla.
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INDEX.

Abdominal Wall, Suture of the, 449.
Adrenalin, The Active Principle of the Suprarenal Gland and its Mode of Preparation, 202.
Alcohol, Some obscure injuries following the toxic use of, 111.
Alcoholic Liquors, Some of the Evil Effects Resulting from the Use of, 104.
AMBERG, EMIL, 54, 81, 121, 131, 229.
American Aboriginal (Indian) Contributions to Therapeutics, 212.
Anemias Secondary to Gastro-Intestinal Disease, With Report of Two Cases, 162.
Appendicitis, With Report of One Hundred Consecutive Cases Operated, 446.
Asthma, 84.
Bacillus Ærogenes Capsulatus, Infection from the, Report of a Case, 350.
BAILEY, WILLIAM, 185.
BARCLAY, WM. F., 79, 187.
BATTEN, JOHN M., 93, 178, 190.
BENNETT, PORTON, 93.
BILLINGS, FRANK, 11.
BROPHY, TRUMAN W., 130, 309.
BUCHMAN, A. P., 184.
BURR, C. B., 148.
CARSTENS, J. HENRY, 365, 426, 476.
CHAMBERLIN, C. S., 188.
Circumcision and Venereal Diseases, 270.
COBB, CAROLUS M., 70, 83, 102, 209.
CORDIER, A. H., 1, 386, 432, 435.
COULTER, J. HOMER, 80.
CROTHERS, T. D., 68, 111.
DAVISON, CHAS., 362, 363, 427, 449, 465.
"Dentists' Neck," An Undescribed Neurosis, 122.
Diagnosis, Scientific Aids to, 60.
Dysentery, The Surgical Features of Typhoid Fever and, 413.
Dyspeptic's Diet, The, 191.
EISENDRATH, D. N., 384, 387, 388, 446, 464.
EVE, DUNCAN, 443.
Formaldehyde and its Salts in the Treatment of Tuberculosis, 42.
Fractures, 325.
GALLANT, A. ERNEST, 388.
Gastro-Enterostomy, Some indications for, 417.
Gastro-Intestinal Disease, Anemias Secondary to, With Report of Two Cases, 162.
GILLETTE, WM. J., 466, 480.
GOLDSPOHN, A., 339, 444.
GREENLEY, T. B., 104.

HAY, EUGENE CARSON, 277.
Hay Fever, 96.
HAYDEN, A. M., 333, 376, 478.
HEIDINGSFELD, M. L., 287.
Hematology, 149.
Hepatopexy, 365.
Hernia, Features Determining Permanency of Cure in Radical Operations for, 436.
HOLINGER, J., 92, 103.
HOLTON, HENRY D., 60.
HOUGHTON, E. M., 198.
HOWARD, H. C., 42, 56.
HUGHES, C. H., 53, 120, 139, 189, 332.
HUNTER, J. W., 93.
Infectious Diseases, A Discussion of the Morbid Conditions of the Upper Respiratory Tract Resulting from the, 70.
Insane, The Necessity of and Indications for the Bed Treatment of the, 140.
Intestinal Auto-Infection, 178.
Intestinal Surgery, The Use and Limitations of the Elastic Ligature in, 404.
JACOBSON, JULIUS H., 350, 363.
JOHNSON, J. LIVELY, 378, 428.
KAHLO, GEORGE D., 186, 191.
KEMPER, G. W. H., 120.
LEARNED, J. B., 147.
Liver, Movable, 365.
LOVE, I. N., 183.
MARTIN, THOMAS CHARLES, 399, 430.
MAYO, WM. J., 387, 433, 434, 435, 447, 479.
MCCASKEY, G. W., 69, 102, 131, 162, 187, 210.
MCDONALD, WILLIS G., 376, 430.
MCFARLAND, JOSEPH, 56.
MCGAHAN, C. F., 34, 58, 59, 210, 211.
MCGRAW, THEO. A., 385, 386, 388, 404, 431, 432, 434, 436.
Medicine, Address in, 11.
Medicine, What are the Qualifications Necessary for Success in the Practice of, 11.
MILLER, ENOCH H., 93.
Minutes, 481 to 493.
Minutes of the Medical Section, 493 to 496.
Minutes of the Surgical Section, 496 to 498.
MOYER, H. N., 69, 103, 130, 211.
MURPHEY, A. D., 96, 103.
Necrology, 498 to 500.
Nephrolithiasis, Some Phases of, 1.
Nervous Health, The Acquirement of, 133.
NORBURY, F. P., 139, 140, 149.
NORTH, JOHN, 81, 84, 92, 95, 101, 186, 210.
Obstipation, Congenital Valvular, 399.
OCHSNER, A. J., 307, 335, 426, 436, 448, 478.
Palatal Defects, Surgical Treatment of, 309.
PAQUIN, PAUL, 56.

PEARCE, F. SAVARY, 131, 133, 140.
Pelvis, Tripartition in the Study of the Female, 388.
Pharmacologic Action of Drugs, 198.
PHELPS, A. M., 387, 429, 336.
Physician, The Young, 229.
President, Address of, 1.
Prostatic Diseases, The Necessity for Exact Diagnosis in Certain Operative, 257.
Prostatic Surgery, The Limitations and Uses of the Galvano-Cautery in, 265.
Pulmonary Abscess, The Surgery of Gangrene and Bronchiectasis following Pneumonia, 239.
Respiratory Tract, A Discussion of the Morbid Conditions of the Upper, 70.
Roster of Members, M. V. M. A., 500.
Rubber Gloves, A Preliminary Report on Sterilization of, etc., 339.
SAYRE, REGINALD H., 22.
SCHMIDT, LOUIS E., 257.
SHARP, H. C., 301, 308.
SMITH, E. B., 388, 325.
SPITZLEY, W. A., 270, 464.
STERNE, ALBERT E., 68, 122, 132, 148, 189.
STEWART, H. J., 93.
STEWART, WELLINGTON T., 333, 334.
STUCKY, THOMAS HUNT, 182.
Surgery, Address in, 22.
Syphilis, Modern Methods of Treating, 277.
Syphilis, Some Causes and Remedies for Ignored, 287.
TAKAMINE, JOKICHI, 202.
The Vas Deferii, The Severing of, and its Relation to the Neuro-Psychopathic Constitution, 301.
THORN, S. S., 363.
Tripartition in the Study of the Female Pelvis, 388.
Tuberculosis, 42.
Tuberculosis, Treatment of at Home, 34.
TUCKERMAN, L. B., 363, 424.
Typhoid Fever, The Surgical Features of—and Dysentery, 413.
Varicose Veins and their Treatment, 378.
Venereal Diseases, Circumcision and, 270.
WALKER, H. O., 383, 435.
WARNER, L. H., 79, 91, 92, 149.
WEAVER, H. B., 54.
WHITMORE, B. T., 55, 121.
WISHARD, WM. N., 265.
WYMAN, HAL C., 413, 432.

MB 478